YOUR COMPUTER

£2,000 OF ACT PRIZES
WIN 3 APRICOT F1ES

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£1

JULY 1985 BRITAIN'S BIGGEST-SELLING HOME COMPUTER MAGAZINE Vol. 5 No. 7



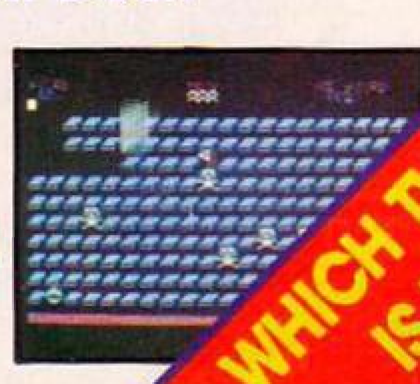
HOW BRITISH ADVENTURE WRITERS BEAT THE YANKS AT THEIR OWN GAME

ATARI ST v. APRICOT F1E Battle of the supermicros

Spectrum Backboogie, Ramdisc and Waves
Amstrad Back-up and Space Eggs
CBM-64 Move Screen and BBC Beebski Beat

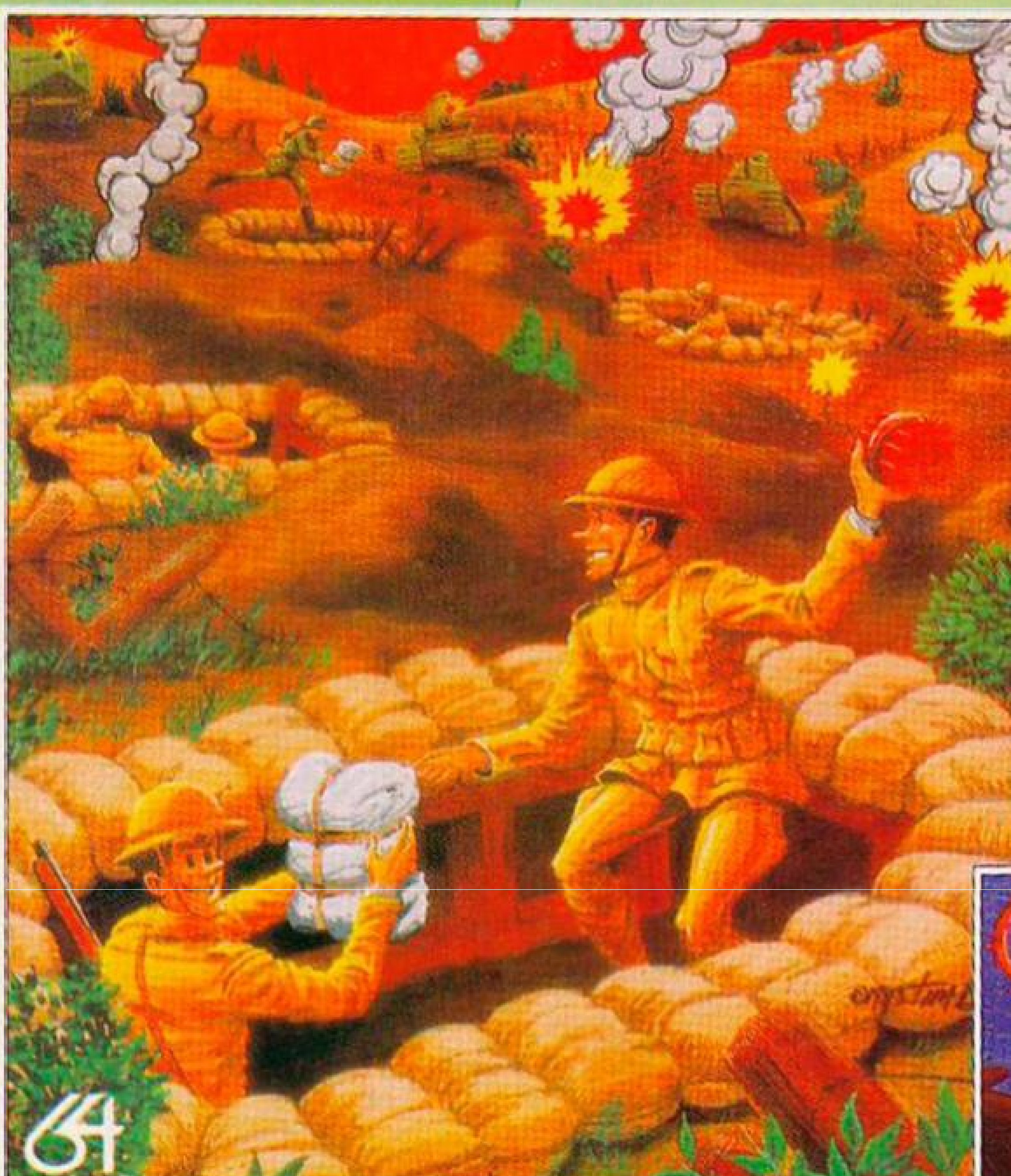


Plus BBC/ Electron Jump Jet and CBM-64 Death Trap



WHICH TV MONITOR IS THE BEST?

DOUGHBOY



synsoft

The bugle has sounded.

It's time to hit the trenches for a fun filled contest of bravery and tactics.

Your mission: recover the supplies that are scattered across the playfield while avoiding enemy troops trying to do exactly the same thing.

You've got rocks, trees and trenches to shelter you from fire, but only your speed, and wits can protect you on the long open stretches you must cross.
And there are the mortars. . .

Doughboy™ will give you hours of excitement trying to out-wit some of the cleverest opponents your computer can throw at you!

DISK £14.95
CASSETTE £9.95



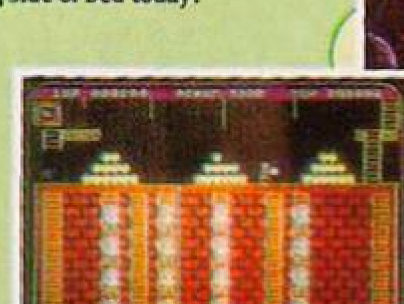
Quasimodo likes bells. They make him feel good – they make him happy – they are his friends.
All Quasi wants is to be left alone, but those nasty soldiers think that he stole the royal jewels.
Quasi didn't steal them!
Quasi wants the soldiers to leave him alone. They fire arrows at him. Quasi doesn't want to, but Quasi will throw big rocks at the soldiers.
Quasi knows a secret! Quasi knows where the jewels have been hidden in the castle and only Quasi can climb there!
Now the noise has stirred up the bats in the belfry. Quasi better jump away from those bats!
Quasi think he got up on the wrong side of bed today.

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ocean

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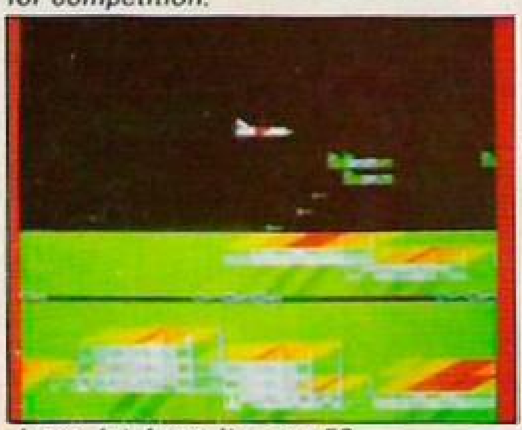


YOUR COMPUTER Contents

JULY 1985

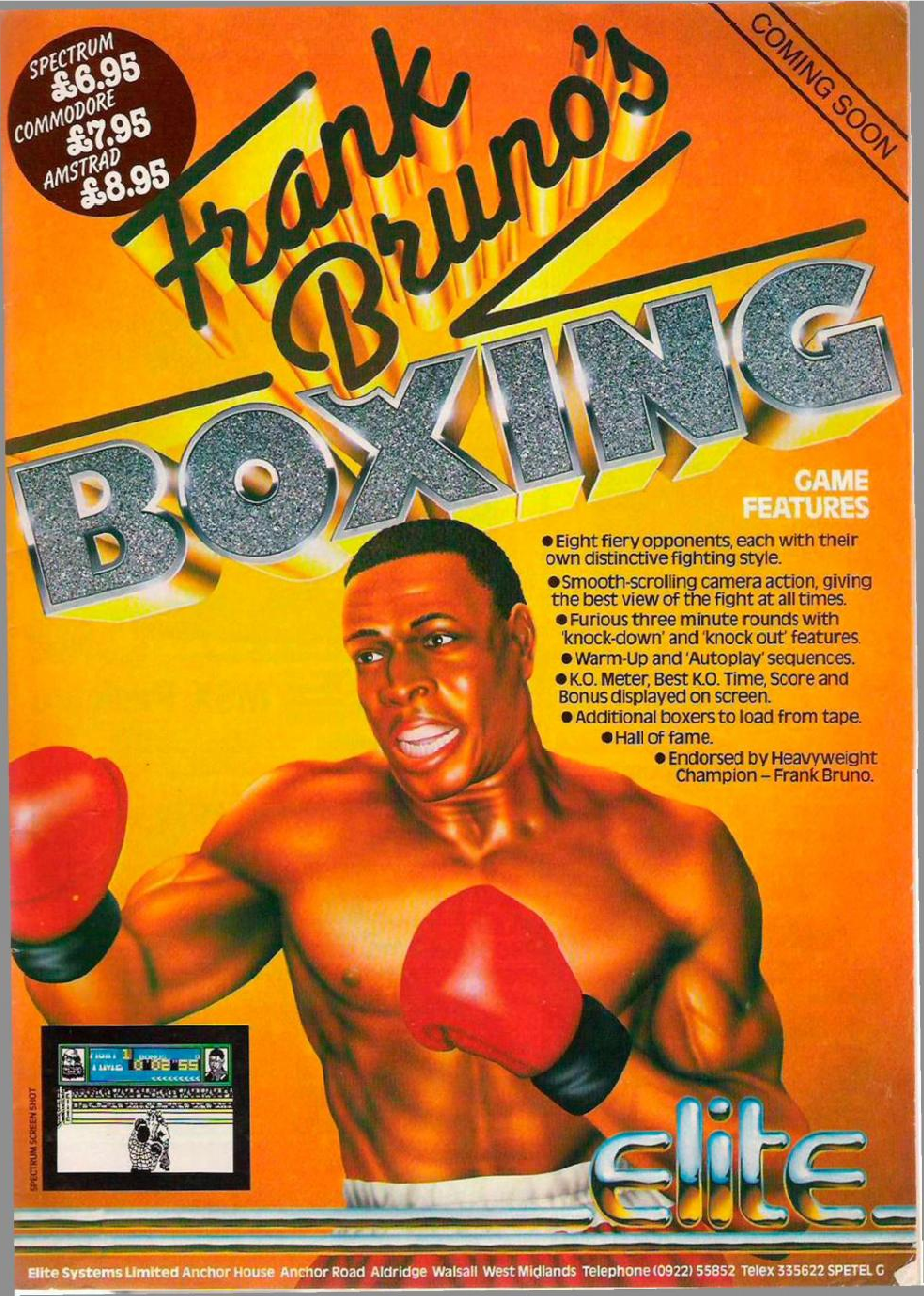

Atari 520ST review: page 40.


ACT FIE: page 47 for review and page 85 for competition.


Jump Jet Assault: page 52.


Cover shot — Brits beat Yanks in adventure writing: page 36.


NEW RELEASES
Fantastic Voyage
The game of the film by
20th Century Fox
6.95 48K SPECTRUM
Mighty Magus
QUICKSILVA
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Quicksilva Mail Order,
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Telephone (0202) 891744.
Selected titles available at:
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Frank Bruno's
BOXING
GAME FEATURES
●Eight fiery opponents, each with their own distinctive fighting style.
●Smooth-scrolling camera action, giving the best view of the fight at all times.
●Furious three minute rounds with 'knock-down' and 'knock out' features.
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- Pin sharp picture gives a bright, clear image almost anywhere, anytime.
- Powered from long life lithium batteries or via optional mains adaptor
- Receives UHF broadcasts anywhere (except France and Communist Bloc)
- Complete with integral fold-away aerial; personal earphone and smart soft carrying case and battery

£99.95

Accessories:

Optional mains adaptor	£7.95
Spare batteries, pack of 3	£9.95

Only £8 monthly with Spectrum Chargecard*. APR 29.8% (variable).



SAVE OVER £150

NEW!

Commodore 64 Business Package

Spectrum Price £549.95

- Commodore 64 Computer
- Commodore 1541 disc drive
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- Plus "Future Finance" & "Easy File"

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Spectrum Price £308.50

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"Super Value"

MSX Package

- Goldstar MSX Computer
- Mitsui quick data drive
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- Two discs for quick data drive

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New Products!

Enterprise Computer

- RAM 64K expandable to 3.9 megabytes
- ROM 48K including BASIC cartridge expandable up to 3.9 megabytes
- Very sophisticated operating system, providing a dynamic memory management technique around a Z80A processor running 4MHz
- Built in word processor
- Graphics resolution up to 672 x 512, colours up to 256 on screen
- Stereo sound from 4 voices over 8 octaves
- Fully structured ANSI standard BASIC
- Keyboard, 68 full travel keys, space bar and built in joystick
- 2 external joystick ports, 2 cassette interfaces
- Parallel printer port, RGB monitor output
- Full expansion possible via a 64-way interface
- RS423 serial interface and built-in network for up to 32 computers
- Cartridge ROM bay, to 64K



£179.95

Only £11 monthly with Spectrum Chargecard* APR 29.8% (variable).

Mitsui Quick Data Drive for MSX Computers	£139.95
Mitsui Quick Data Diskette	£3.99
Cumana Electron Interface	£149.95
Commodore Business Package	£549.95
Quendata DMP1100 Printer	£269.99
Juki 2200 Portable Typewriter/Daisywheel Printer	£343.83
Canon PW1080A Printer	£349.00
Elephant 5¼" Diskettes (IQ Box) from	£22.50
System 2000 Computer Desk and Monitor Bridge	£49.95

Super Computer Offers from Spectrum



£349.95

BBC Model B

with built in Speech Synthesiser worth £50

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£129.95

Sinclair Spectrum +

"Fantastic Value for Money"

- 48K RAM
- 8 colours
- 10 octave sound
- Professional keyboard

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Spectrum 48K

Plus FREE! Software 6 Pack



£89.95

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Includes:
- Atari 1010 data recorder
- Introduction to programming software
- Pole position game cassette
- Demonstration cassette

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Not all stores carry every advertised item, please phone before making a journey · prices correct at time of going to press E&OE

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Super Value
Printers & Disc Drives
from Your Computer Specialist Nationwide



Brother EP-44 Printer/Typewriter

£249.95

'Transforming Office Machinery', runs Brother's slogan - with these super-compact battery powered type-writers it's easy to see why.

- Top quality thermal head
- 4K of text memorise (3 A4 pages)
- Centering if required
- 15-digit LCD display for pre print corrections
- Line-by-line edit facility

Only £11 monthly with Spectrum Chargecard*. APR 29.8% (variable)



£199.00

Commodore 1541 Disc Drive

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- Expansion bus for other peripherals
- Built in disc controller and operating system

Only £9 monthly with Spectrum Chargecard*. APR 29.8% (variable)



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Amstrad 3" Disc Drive

- 3 inch disc drive
- Single sided, double density
- CPM & Logo
- Built in power supply
- Complete with interface

Only £9 monthly with Spectrum Chargecard*. APR 29.8% (variable).



£199.95

Brother M1009 Printer

- 50 cps Bidirectional printing
- normal/enlarged/condensed/emphasized/Elite /superscript/subscript characters
- Centronics interface
- Optional RS232 Interface

Only £9 monthly with Spectrum Chargecard*. APR 29.8% (variable)



£149.95

Brother HR5 Printer with Commodore Cable

- Top quality Letter-quality daisywheel printing
- Between 13 and 18cps
- Bi-directional printing
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Cumana Disc Drives



NEW LOWER PRICES

NEW LOWER PRICES

CSX 100 40 Track 100K SS	£124.95
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Cumana 351 SS 40 Track 3½" Drive	£159.95
Cumana 354 DS 80 Track 3½" Drive	£229.95

Juki 2200 Printer

NEW!



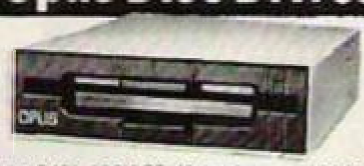
£343.85

Electronic daisywheel typewriter with RS-232C or Centronics Interface for computer printer

- 10 cps
- 10/12/15 cpi pitch
- 12 inch paper width/9 inch print width
- Normal/decimal tabs

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Opus Disc Drives



Opus 5401 100K SS 40 track	£149.95
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Opus 5802 400K DS 40/80 track	£199.95
Opus 5802D 2x400K DS 40/80 Track	£499.95

Entrepo Quick Data Drive



£79.95

- Quick operating system
- Extra blan microwafer and operating manual

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NEW!

Quendata DMP 1100 Printer

- Bi-directional printing
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- Centronics interface
- Optional RS232 interface

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£399.00

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- 10/12/15 or Proportional character spacing
- Bidirectional friction-feed
- Tractor-feed or cut paper

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£139.95

'New Exclusive'

Mitsui Quick Data Drive for MSX

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Also available

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MSX Monitor Lead	£3.95
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Canon PW-1080A

NEW!

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£349.00

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Rotronics Wafer Drive



£129.95

- Versatile twin datadrive for the ZX Spectrum
- Twin 128K drives
- 16K, 64K or 128K Wafers

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Allows you to run 3-3½" or 5¼" disc drives with Spectrum or Spectrum Plus

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Spectrum Computer Centres have no connection whatsoever with the ZX-Spectrum Computer manufactured by Sinclair Research Ltd.

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spectrum

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£199.95

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£230.00

- 14" colour, sound monitor
- PAL/RGB composite
- Tint and volume controls

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Standard Resolution for BBC



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- 8 channels
- 14" tube

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£146.05

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Super Value Accessories

Super Value Package for Spectrum
Currah Microslot for ZX Spectrum
Currah Microspeech for ZX Spectrum



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- Quickshot II joystick

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£41.75

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for the Spectrum



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Potty Pigeon	£6.95	£6.25
Sam Stoat	£6.95	£6.25
Wordspell	£9.95	Half Price
Air Traffic Control	£7.95	£7.15
Avalon	£7.95	£7.15
Dragontorc of Avalon	£7.95	£7.15
Heathrow International	£7.95	£7.15
Maze Chase	£5.95	Half Price
Night Driver	£5.95	Half Price
Nightflite II	£7.95	£6.95
Technician Ted	£5.95	£5.35
3D Lunar Attack	£7.95	Half Price
C Compiler (Hi Soft)	£24.99	£22.50
Dev Pac 3 (Hi Soft)	£14.00	£12.50
Pascal (Hi Soft)	£25.00	£22.50
Ultrakit (Hi Soft)	£9.45	£8.50
Alchemist	£5.50	Half Price
Arcadia	£5.50	Half Price
Jumping Jack	£5.50	Half Price
Pedro	£5.50	£4.20
World Series Baseball	£6.90	£6.20
Zip Zap	£5.50	Half Price
Zzoom	£5.50	Half Price
Confusion	£6.95	£6.25
Final Mission	£5.95	£5.35
Millionaire	£5.50	Half Price
Moon Cresta	£7.95	£7.15
Mountains of Ket	£5.50	£4.95
Temple of Vran	£5.50	£4.95
Nosferatu	£5.95	£5.35
Jewels of Babylon	£5.50	£4.95
Multi File	£9.95	£8.95
Screen Machine	£9.95	£8.95
Purchase Ledger	£14.95	Half Price
Sales Ledger	£14.95	Half Price
Stock Control	£14.95	£13.50
Animated Strip Poker	£6.95	£6.25
The Great Space Race	£14.95	Half Price
Valhalla	£14.95	£13.50
Adventure Quest	£9.90	£8.90
Colossal Adventure	£9.90	£8.90
Dungeon Adventure	£9.90	£8.90
Emerald Isle	£6.95	£6.25
Lords of Time	£9.90	£8.90
Return to Eden	£9.90	£8.90
Snowball	£9.90	£8.90
Fire on the Water	£9.95	£8.95
Flight From the Dark	£9.95	£8.95
ABC Liftoff	£7.95	Half Price
Countabout	£7.95	Half Price
Snaffle	£9.95	£8.95
Word Wizard	£7.95	£7.15
Confrontation	£7.95	£7.15
Confrontation Scen 1	£5.95	£5.35
Confrontation Scen 2	£5.95	£5.35
Johnny Reb	£5.50	£4.95
Panzer Attack	£5.95	£5.35
Paras	£6.95	£6.25
Redcoats	£6.95	£6.25
Special Operations	£5.95	£5.35
The Bulge	£9.99	£8.99
Blockbusters	£6.95	£6.25
Brian Jacks Superstars	£7.95	£7.15
Eddie Kidd's Challenge	£6.95	£6.25
Olympicon	£5.95	Half Price
Phoenix	£5.50	£4.95
Abersoft Forth	£14.95	£13.50
Classic Adventure	£6.95	Half Price
Hampstead	£9.95	£8.95
Hellfire	£6.95	£6.25
Hobbit	£14.95	£13.50
Hurg	£14.95	£13.50
Melbourne Draw	£8.95	£8.00
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Starion	£7.95	£7.15
4D Terror Daktil	£6.95	£6.25
Spreadsheet	£9.95	Half Price
Project Future	£6.95	£6.25
A Day In The Life Of	£6.95	£6.25
Full Throttle	£6.95	£6.25
Haunted Hedges	£6.95	Half Price
Jasper	£6.95	£6.25
Kentilla	£6.95	£6.25
Luna Crabs	£6.95	Half Price
3D Death Chase	£6.95	Half Price
Omnicalc 2	£14.95	£13.50
Skool Daze	£5.95	£5.35
Sky Ranger	£5.95	£5.35
Wheelie	£5.95	Half Price
Air Traffic Control	£9.95	£8.95
Auto Mania	£6.95	£6.25
Everyone's A Wally	£9.95	£8.95
Pyjamarama	£6.95	£6.25
The Witch's Cauldron	£6.95	£6.25
Alien	£9.95	£8.95
American Football	£9.99	£8.99
Caesar The Cat	£8.95	Half Price
First Steps	£8.95	£8.05
Quick Thinking	£6.95	Half Price
Star Seeker	£9.95	£8.95
Espionage	£8.45	£7.60
Erik the Viking	£9.95	£8.95
Machine Code Tutor	£14.95	£13.50
Squash	£7.95	£7.15
Trashman	£5.95	£5.35
Lightmagic	£14.95	£13.50
Machine Lightning	£19.95	£17.95
Spec Mac Man	£14.95	£13.50
White Lightning	£14.95	£13.50
Armageddon	£5.90	Half Price
Daley Thompson	£6.90	£6.20
Gift from the Gods	£9.95	£8.95
Hunchback II	£6.90	£6.20
Kong Strikes Back	£6.90	£6.20
Match Day	£7.95	£7.15
Mr Wimpy	£5.90	Half Price
Pogo	£5.90	£5.30
Royal Birkdale	£5.90	£5.30
Address Manager Standard	£8.95	£8.05
Address Manager Plus 80	£19.95	£17.95
Casino Royal	£5.95	£5.35
Editor Assembler	£12.95	£11.65
Finance Manager Standard	£8.95	£8.05
Finance Manager Plus 80	£19.95	£17.95
Machine Code Test Tool	£9.95	£8.95
Stock Manager Standard	£8.95	£8.05
Stock Manager Plus 80	£19.95	£17.95
VAT Manager Standard	£8.95	£8.05
VAT Manager Plus 80	£19.95	£17.95
Video Pool	£5.95	£5.35
The Forest	£9.95	£8.95
Editor & Assembler	£8.50	£7.65
Spectrum Monitor	£7.50	£6.75
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Screen Machine	£8.25	£7.40
Mission 1	£7.95	£7.15
Airliner	£5.95	Half Price
Hunter Killer	£7.95	£7.15
Battle for Midway	£9.95	£8.95
Hopper	£5.95	Half Price
Aquaplane	£6.95	£4.95
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Eric Bristow's Pro Darts	£6.95	£6.25
Fred	£6.95	£6.25
Games Designer	£14.95	£13.50
Meteor Storm	£8.95	Half Price
Word Processor	£8.95	Half Price
3D Ant Attack	£6.95	£6.25
Frogger	£5.95	Half Price
Wonder Bender	£5.95	£5.35
3D Starstrike	£5.95	£5.35
3D Tank Duel	£5.95	£5.35
Apocalypse	£9.95	£8.95
Trans Express (cass.)	£9.95	£8.95
Trans Express (mdl)	£14.95	£13.50
Wriggler	£5.95	£5.35
Titanic	£7.95	£7.15
Azimuth Calibration	£5.95	£5.35
Inferno	£6.50	£5.85
Superspy	£6.50	£5.85
Backgammon	£5.95	Half Price
Biorhythms	£6.95	Half Price
Capital Letters	£7.95	Half Price
Castle Spellerous	£7.95	£7.15
Catell IQ Test	£9.95	Half Price
Chequered Flag	£7.95	Half Price
Chess	£7.95	Half Price
Chess Tutor	£9.95	Half Price
Club Record Controller	£8.95	Half Price
Collectors Pack	£6.95	Half Price
Driller Tanks	£5.95	£5.35
Early Punctuation	£7.95	Half Price
English Literature	£6.95	Half Price
Espionage Island	£6.95	Half Price
Flight Simulation	£7.95	Half Price
Glider	£9.95	Half Price
History	£6.95	Half Price
Horace & The Spiders	£6.95	Half Price
Horace Goes Skiing	£5.95	Half Price
Hungry Horace	£6.95	Half Price
Inca Curse	£6.95	Half Price
Inventions	£6.95	Half Price
Learn to Read 1	£9.95	Half Price
Learn to Read 2	£9.95	Half Price
Learn to Read 3	£9.95	Half Price
Learn to Read 4	£9.95	Half Price
Learn to Read	£9.95	Half Price
Make a Chip	£9.95	Half Price
Match Point	£7.95	£7.15
Musicmaster	£9.95	Half Price
Planet of Death	£6.95	Half Price
Print Utilities	£9.95	Half Price
Reversi	£5.95	Half Price
Scrabble	£15.95	Half Price
Ship of Doom	£6.95	Half Price
Small Business Accounts	£12.95	Half Price
Speech Marks	£7.95	£7.15
Stop The Express	£6.95	£6.25
Survival	£9.95	Half Price
The Apostrophe	£7.95	£7.15
Vu Calc	£8.95	Half Price
Vu File	£8.95	Half Price
Vu 3D	£9.95	Half Price
Zeus Assembler	£12.95	Half Price
ZX Forth	£12.95	Half Price
Astronut	£14.95	Half Price
Jet Set Willy	£5.95	£5.35
Learning with Leeper	£9.95	£8.95
Lode Runner	£9.95	£8.95
Manic Miner	£5.95	£5.35
Death Star Interceptor	£7.95	£7.15
Tascopy	£9.90	£8.90
Tasmerge	£10.90	£9.80
Tasprint	£9.90	£8.90
Taswide	£5.50	£4.95
Tasword Two	£13.90	£12.50
Brian Bloodaxe	£7.95	£7.15
Starbike	£7.95	£7.15
Alien 8	£9.95	£8.95
Atic Atac	£5.50	£4.95
Cookie	£5.50	Half Price
Jetpac	£5.50	£4.95
Knight Lore	£9.95	£8.95
Lunar Jetman	£5.50	£4.95
Sabre Wulf	£9.95	£8.95
Trans Am	£5.50	Half Price
Underwurlde	£9.95	£8.95
Beach Head	£7.95	£7.15
Blue Max	£7.95	£7.15
Bruce Lee	£7.95	£7.15
Raid Over Moscow	£7.95	£7.15
Spy Hunter	£7.95	£7.95
Zaxxon	£7.905	£7.15
Racing Manager	£5.95	£5.35
Strangeloop	£5.95	£5.35
The Biz	£7.95	£7.15
The Island	5.95	£5.35
Moon Buggy	£6.95	Half Price
Snooker	£8.95	Half Price
1994	£6.95	Half Price
Android Two	£5.95	Half Price
Cyclone	£6.95	£6.25
TLL	£5.95	£5.35
Blue Thunder	£5.95	£5.35
Howzat	£5.50	£4.95

"NEVER DID TRUST THAT SINCLAIR"

THE SINCLAIR CYNICS have turned full circle. They sneered at his first sub-£100 ZX-80 five years ago, and now they're back rubbing their hands in glee at the first major financial crisis to face him in five years' home computing.

Between the early black box days and the blacker months of early 1985 they jostled to talk to him and listened avidly to his Cromwellian views on *Question Time*. Now they seem to have conveniently forgotten that it was Sinclair who turned the U.K. into the most sophisticated computer market in Europe.

Of course the delayed-delivery and reliability problems that have beset all his machines have left a mark in people's minds, but his achievement in giving Britain more computers per capita than any other country mustn't be played down.

The disasters that have hit other home computer companies — Acorn, Oric and Dragon — have made his search for £10 million to £15 million for "financial reconstruction" particularly difficult; and the C-5 electric bidet hasn't done much to help. Despite the politicians' and the City's often confessed undying love for new technology, they run a mile when faced with the real thing. They'd rather invest in cabbages than computers.

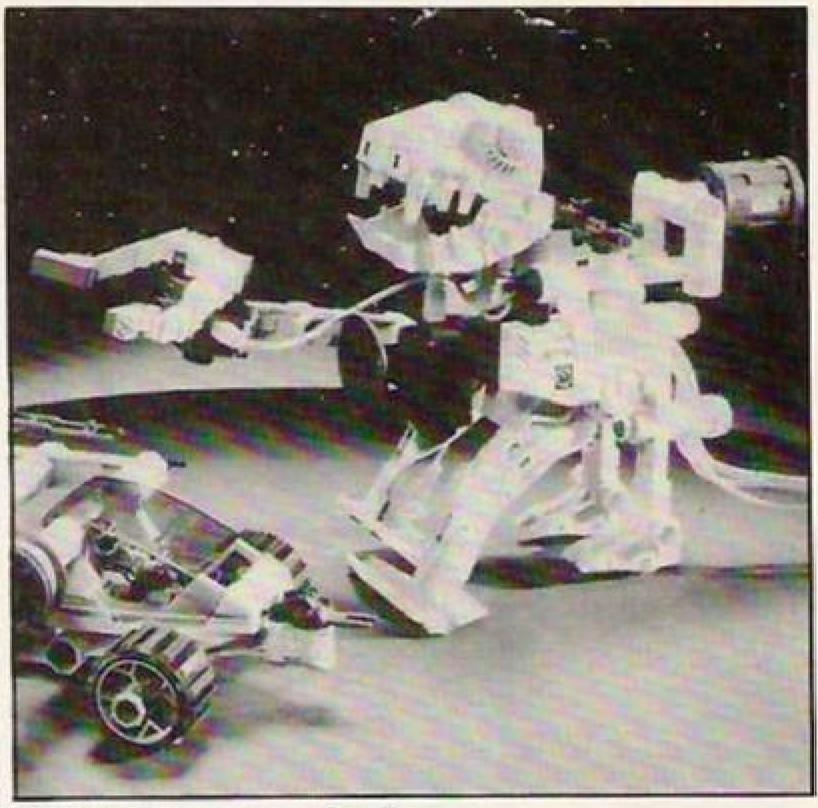
Behind Sinclair's cash crisis lie many reasons, some common to all computer manufacturers, others unforseeable. Christmas was bad everyone agrees, but nobody thought it was as bad as the £30 million of unsold Sinclair stocks seem to show.

The main obstacle between Sinclair and a flow of new funds is the understandable fear that he has become a one-product company — the Spectrum. And many believe that even that machine is well past its money-making heyday as it celebrates its third birthday in a quiet summer.

Sinclair's hopes are pinned on summer pocket TV sales balancing up the computer market's lopsided Christmas booms. He still believes the QL will make its long-awaited impact — he's planning to give a September release to a half megabyte wafer-scale technology disc drive for it.

Apart from red faces in the highest places in the land, Sinclair's difficulties may at least show that new technology is perhaps not such an easy solution for rebuilding the nation's wealth.

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"Take me to your teacher."

CHALKIE ROBOTIX

ACTION MAN lookalike Gaxon Graves is teaching Welsh 10-year-olds Logo with the help of his control vehicle Robotix.

Robotix is a £60 construction kit including four motors, five channel control and 100 parts which kids can use to construct 10 different vehicles and robot arms. In America, where Milton Bradley has been selling Robotix for a year, it is already available with an Apple interface and software. Now David Wharry of the Micro Electronics Programme and Patrick Drewett, a teacher at Coed Eva Junior School, Cwmbran, are experimenting with Robotix kits linked through a Deltronics controller to BBCs to teach the principles of problem solving, control and technology.

MSeXtra res

PRIVATELY MSX computer makers are showing off the new extended specification MSX-E micros with 512×192 resolution, 80-column text display, 256 colours and nine-voice sound which will go on sale in Japan this autumn. Publicly in Britain the likes of Sony, Toshiba and Mitsubishi insist that they will be selling only the existing under-specified over-priced MSX machines until after Christmas.

Toshiba, which has sold more MSXs than anyone else in Britain, unveiled its MSX-E, HX-23 and HX-22 micros at the consumer electronics trade shows in London last month. The 23 has 80K of video Ram and can interface to a video disc player. JVC also showed their current MSX hooked up to a video disc running a demonstration golf game. As promised at the MSX launch, MSX-E retains upwards compatibility — it will run all existing MSX software — although, of course, new programs written to take advantage of the expanded MSX-E graphics and sound capabilities will not be downwards compatible.

In Japan MSX-E machines will start at around £350 — although some will include a built-in disc controller. Others may go further — Spectravideo is building in a complete disc drive.

EUREKA FOR ORIC
Normans conquer Atmos

EUREKA INFORMATIQUE, which distributes British computers in France, has bought Oric for several hundred thousand pounds and will move production of Atmoses to its computer peripheral plant in Normandy later this month.

Oric, which announced its Spectrum-bashing 16 and 48K Oric 1 at the end of 1982 suffered repeated financial crises and uncertainty which prevented it from competing successfully with Sinclair in Britain, although as Jean-Claude Talar, Eureka President points out it "enjoyed a good reputation in France".

Earlier this year Oric had to finally call in the receiver who has sold all rights to Oric's future plans for home micros including the Stratos and a 68000 based machine, as well as substantial stocks of components, half-built, and completed Atmoses to Eureka. Oric's other assets, including chip designs for an ultra low-cost IBM compatible will be sold elsewhere. Initially Eureka intends to assemble Orics in Normandy, until the stockpile of components runs out, and sell them in France.


Stillborn Stratos.

In August or September, Eureka will decide whether to go ahead with Stratos, a 64/128K micro with a built-in disc interface and perhaps modem, and whether to go back into the British market.

British Oric owners lost their warranties when the company crashed but Eureka will be announcing details of a new support service for software, repairs and peripherals next.

WE'RE ALL GOING ON A CBM HOLIDAY

COMMODORE ENGINEERS from Britain and Europe flown to California to see the Amiga are impressed with the graphics. CBM's new 68000-based micro will hit the U.K. in 1986 and its £1,200 price includes a 3.5in Sony disc drive and a two-button mouse.

But the graphics chips will appear in future Commodore home computers. Resolution is better than TV quality — up to 1024×800, and 4096 colours all available through a GEM-like operating system. You can have five windows on screen with 16 colours in each. Amiga also has a built-in synthesiser to sound the battle cry against Tramiel's "Saint".

Commodore is also offering free trips to anyone who will take a CBM-64 off their hands this summer. For £199 you will get a 64, C2N Data Recorder, a brilliant game — International Soccer — and three days free accommodation at one of 250 hotels in Britain and Europe. A Commodore front man was able to reassure the unduly cynical that you would have some choice "the hotels are not all in Sutton or Albania". The Plus 4 is being packaged with a 1541 disc drive, MPS 801 printer and Inpec business software for £450.


Chicago price tag for 128 was $300.

Atari 520 not out CPC 128 declared

YORKIE MAN Alan Sugar sold us a dummy last month when he launched his disc-based CPC 664 without the extra Ram we'd predicted. But now the Amstrad 128 has appeared — in Chicago at the Consumer Electronics Show.

Enterprise, meanwhile, has named the price for its 128K micro which has 113K user memory and is 30 percent faster than, yet compatible with, its 64K cousin. Companies like U.S. Gold, Ocean, and Domark with its new James Bond game, are now writing Enterprise versions. The 128K micro will cost £250 while the 64 drops to £180 — that for a machine with 672×512 resolution.

Down in Slough, Atari's first batch of STs — only 520 of them oddly enough — are now with software houses and the like. First consumer deliveries should be through Atari loyalists Silica shop in Sidcup.

Remember Harold in 1066 Maggie

NOW THAT Halley's Comet is almost within range for amateur astronomers, Eclipse Software's £7 prediction program for the Spectrum can show you where in the sky to find it — for any time, date and latitude — important because many comet watchers may flee south to Australia for the best view of the giant snowball as it becomes visible to the naked eye late this year and early in 1986.

Gooch out for 64

ENGLAND V AUSTRALIA without having to worry about the mortal remains of Lord Darnley's stump. Gooch's Cricket, £10 from Audiogenic, puts batsmen and bowlers alike at the mercy of your joystick.

DIARY

IF YOU ARE privileged enough to walk around Acorn's corridors of power and hear a cry of Alex Uboldi, it is probably not a comment about worried looking Chairman Alex Reid's rapidly thinning hair. Alex has much to worry about, what with the share price at an all time low of 9p, rumours of disaffection from Chris Curry, and PR firm Quentin Bell ditching Acorn because the company had so little to publicise. Olivetti has now put in an Italian, Alex Uboldi, as Managing Director of Acorn.

TRAMIEL still managed to surprise Chicago by launching the 260ST after all, at the Consumer Electronics Show. 256K Ram with a built-in 500K Sony drive and a black and white monitor will cost $500.

STILL AT CES, rival British software houses seen dragging bags full of cash around as they try to gazump each other bidding for U.S. blockbusters. Wary of disappearing British companies, the Americans are demanding, and getting, six-figure royalties for their games with up to $50,000 up front.

SOMEONE AT ULTRATEC has just discovered rude words and for some reason has decided to fill the loader program of the AMSDISK tape to disc utility which they sell, with abuse.

We heard about it from J. Shaw, whose 11-year-old daughter was given Amsdisk on her birthday. She called him in after listing 70 lines of abuse which include the line "I've left Basic unprotected to let people see these f***ing comments". Now Shaw, who tells us that his occupation allows him "access to computer files" and that he has "given the tape to my superiors for a decision to be made regarding prosecuting" has sent a copy of the offending lines to the Trading Standards Office.

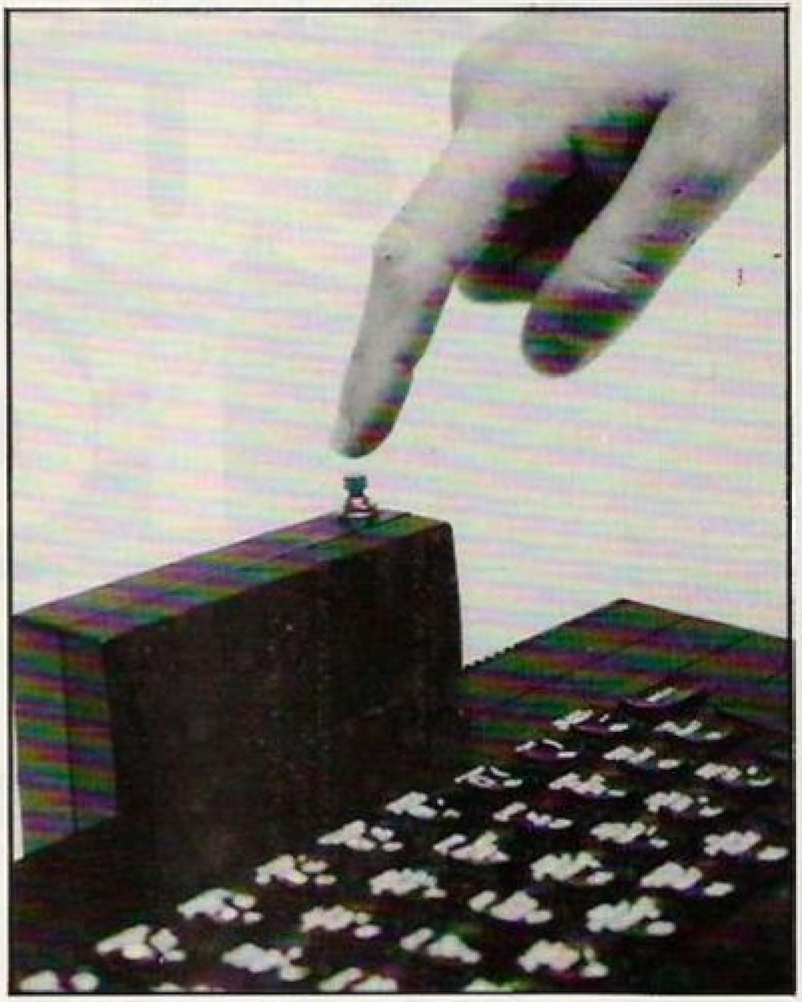
We cannot guarantee that anyone who sends money to Ultratec will now be sent anything in return while an investigation is carried out into the legality of sending obscene listings through the post.

Elsie Dee

DON'T TOUCH
Software industry at risk

"DON'T TOUCH" is the advice Tim Langdell of the Guild of Software Houses is giving to anyone tempted to use Evesham Micros Interface III to copy software tapes. One touch of the button once you have loaded the program and the Interface III dumps the whole contents of a Spectrum's memory onto microdrive, evading all the protection devices so far developed for commercial software.

Evesham advertises the unit for making back-up tapes but Roger Tuckett of the Federation against Software Theft points out that the William Powell Computer Copyright Bill should become law this month and then making back-ups other than for research and private study — which is narrowly defined will be a breach of copyright. Selling copies is punishable by fines and imprisonment. Tuckett condemns "companies like Evesham Micros which sell machines under the guise of making back-ups."



A crime is about to be committed.

Longdell does not believe that there is any such thing as an innocent copy. "I have never found the need for a back-up — you have to do something extreme to a tape, like dropping it near a magnet or letting the dog chew it." If a program does not load as easily on the 1,000th occasion as it did on the first, GOSH believes that the software house should replace it.

Up until Interface III, better software protection had made it more difficult to break into programs while speed loaders had reduced tape to tape copying. A new wave of piracy could be the last straw for ailing software houses.

PLUS, TV AND PRINTER £200



Sinclair tries to wake up Spectrum sales.

SINCLAIR IS BUNDLING up a Spectrum, flat screen TV, ZX Printer and software including Vu 3D, Chess and four other games for £199 in a summer offer through Dixons. Although you cannot use the £100 miniature screen with your micro — it has no aerial socket — Sinclair's reasoning is that a go-anywhere TV is the sort of product that will appeal in the summer when computer sales are otherwise at their lowest.

Brussels spurs cards

IN THE WAKE of the Brussels European Cup soccer disaster, football clubs are starting to take Sperry's idea for providing computer identity cards for fans to curb hooliganism seriously. Chelsea is signing up and Stockport, Bournemouth and Reading, amongst others are considering similar systems. Although the scheme has been written off as unworkable by Ted Croker of the FA and Chief Constable Anderton of Manchester, small First Division clubs like Luton and Oxford which plan to ban all away fans from league matches might find the Sperry Systemsolve plan effective.

POP★ TOPS

TOP 20

1	World Series Baseball	Imagine	Sp
— 2	Booty	Firebird	Sp
3	Softaid	Ethiopia Appeal	Sp
4	Wild Bunch	Firebird	Sp
5	Shadow Fire	Beyond	Sp
6	Brian Jacks Challenge	Martech	Sp
7	Grand National	Elite	Sp
8	Dragon Torc	Hewson Consultants	Sp
9	Gyron	Firebird	Sp
10	Everyones a Wally	Microgen	Sp
11	Match Day	Ocean	Sp
12	Arnhem	CCS	Sp
13	Starstrike	Realtime Software	Sp
14	Gremlins	Adv International	Sp
15	Death Star Interceptor	System 3	Sp
16	Minder	D.K'tronics	Sp
17	Jonah Barringtons Squash	New Generation Software	Sp
18	Overdrive	Superior Software	El
19	Bumper Bundle	Alligata	El
20	Alien 8 ·	Ultimate	Sp

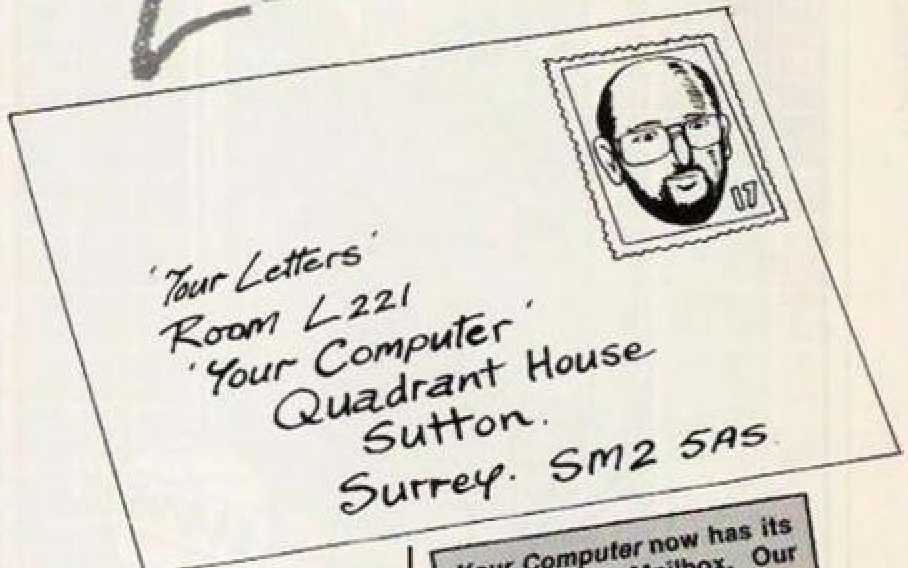
Sp = Spectrum El = Electron
Source = WH Smiths.

TOP 3 BY MACHINE

1	R.I.P.	M. Tronic	Vc
2	Rockman	M. Tronic	Vc
3	Mickey the Brickey	Firebird	Vc
1	Basketball	CBM	64
2	Gates of Dawn	Virgin	64
3	Chiller	M. Tronic	64
1	Starion	Mel. House	Sp
2	Booty	Firebird	Sp
3	Bruce Lee	US Gold	Sp
1	Football Manager	Addictive	Bc
2	Wizardore	Imagine	Bc
3	Elite	Acornsoft	Bc
1	Bruce Lee	US Gold	At
2	Spitfire Ace	US Gold	At
3	Fort Apocalypse	US Gold	At
1	BMX Racers	M. Tronic	16
2	Exorcist	CBM	16
3	Wizard & The Princess	Mel. House	16
1	Overdrive	Superior Soft	El
2	Elite	Acornsoft	El
3	Football Manager	Addictive	El
1	Ghost-busters	Activision	Am
2	Combat Lynx	Durell	Am
3	Decathlon	Ocean	Am
1	Ghost-busters	Activision	Ms
2	Crazy Golf	Mr Micro	Ms
3	Jet Set Willy	S. Projects	Ms

Vc = Vic 20 64 = CBM 64 Sp = Spectrum Bc = BBC At = Atari 16 = CBM 16 El = Electron Am = Amstrad Ms = MSX.
Source = Websters Software.

YOUR Letters



Your Computer now has its own Prestel Mailbox. Our number is 019991800. If you have any program enquiries send us a message. We will try and give you an answer within a few days.

MAXAM IS VINDICATED

MAY I reply to Nick Godwin's attack on our products printed in June's Letters Page.

Our policy is simple. We find it morally unacceptable to market software knowing that it does not perform to the advertised specification. We are grateful to any customeer who can substantiate their claim that a program contains a bug. In such instances, or where tape duplication is faulty, we replace it without quibble. As features have been added to MAXAM upgrades have been offered to old customers.

Now to Mr. Godwin's two-pronged attack. He wrote to us in March praising the product and with a request to 'borrow' a Rom version, after mentioning a couple of mythical bugs. These bugs do not and have never existed — even in the earliest production copies. Bugs as serious as those reported by Mr. Godwin would have been spotted months ago by the 5 in-depth magazine reviewers, the dozen or more leading software houses and the 500 plus owners of the various versions of MAXAM!

His second, rather more insidious attack on my marketing strategy, together with his pontificating on the merits of a Rom-based utility at all, show an alarming degree of general ignorance for a man in charge of a user-club newsletter! Our marketing strategy is based on factual information, and in support I can refer you to the June edition of *Amstrad Computer User*, containing a detailed article writen by someone rather more clued in than Mr. Godwin.

David Fisk,
Arnor Limited.
London SE25.

Editorial comment: *We find David Fisk's reply wholy convincing. A number of readers have confirmed that Arnor's cassette-based assembler is bug-free, and, indeed, an excellent program. As for the Maxam Rom we stand by the judgement of our May review that "this looks like a product no serious Amstrad user can afford to be without."*

SLOPPY PROGRAMS

I REALLY CAN'T let you get away with your article in May's First Bytes, entitled Elegant Programming. I cannot fault the third or the first program — in either version — but two out of six is not enough for programs of this size.

The first thing that a beginner must learn about loops is that you should not jump out of them. Some Basics are more tolerant of this than others, and with all of them it will be forgiven in a very short program, but it is surely something that any programmer must discipline himself to avoid. Program 2 gives the game away. Line 20 reads:

```
20 IF L=7 THEN ?"SEVEN":
L=10:GOTO40
```

The whole point is that by making L=10 you do not need the Goto. The program will leave the loop naturally — and more quicky. In program 5

```
IF D$="ORANGES"THEN60
```

should be changed to

```
THEN L=5
```

for the same reason.

Program 4 has no semicolon between "Countdown" and CD. I am aware that you don't need one on the Apple, but most computers would crash here.

Program 6 is more spectacular with two jumps out of a loop, an error in line 50 that would produce the opposite statement to that required if it ever got there. On most computers it is unlikely to do so, as the Mid$ will have to read beyond the end of the string. Line 30 should be

```
FOR L=1 TO LEN(A$)-2
```

and line 50 should start

```
IF L=LEN(A$)-2
```

if we must do it that way. Better to omit line 50 and add 65

```
?"NO MATCH":END
```

I took Program 1 to heart. I am sloppy. Whether you put Next or Next D is a matter of style. The former saves space and is quicker, the latter is more readable. I did not think one was wrong and the other right. But I have taken the message to heart, and decided that I would rather be sloppy than elegant.

Geoffrey Childs,
Winchcombe,
Gloucestershire.

SPECTRUM TIPS

SPECTRUM owners may like to use some of my routines.

```
POKE 23659,0
```

makes the Spectrum crash if anything is printed in bottom part of the screen. e.g. error messages or breaks. (To disenable this routine use Poke 23659,2)

```
PRINT USR 0
```

Completely clears the memory. (New only clears the Basic)

(continued on page 19)

'AMSTRAD CPC 664 IS OK'

MAY I be so bold as to suggest that Mr Lee Paddon takes a driving lesson or two before he tries to rev up another computer.

I noticed in the review he did of the Amstrad CPC-664 several unfortunate mistakes. These errors could I suppose influence potential purchasers of this fine machine into looking elsewhere.

For a start the 3in. discs have when formatted for a CPM system disc 169k, or as a Data disc i.e. no CPM 178k or in IBM format 154k. Additional to the free space is a 2k directory on each side.

A renumber command is included in the Basic.

With regard to the Warm Reset, what point is there in a warm reset if you have very good On Break Gosub protection. And if one were to read the manual it details how to define a function key to reset the mode and colours etc.

All in all I suppose it was a reasonable review but for the fact of the above errors.

S. Potter,
Brinsley,
Nottinghamshire.

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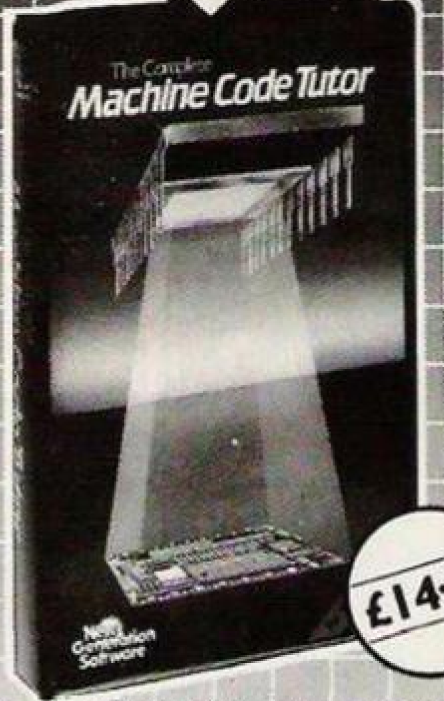
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IN ★ TOUCH

How to write for *Your Computer*

We called this magazine *Your Computer* precisely because we welcome your views, tips and hints and even your criticisms of machines and software in general. Here's how you go about getting your name into print. Your article should be typed, double-spaced, on A4 paper. A name and address on each sheet would help. Don't forget to tell us which machine it runs on. With programs please include a cassette or disc and some indication of how long it is. Please put what machine it's for on the envelope. Don't forget full instructions to us how to load and list your program and how to enter it for the readers.

The article must be submitted exclusively to *Your Computer*. We pay £35 per published page — that's as it appears in the magazine and includes illustrations.

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Telsoft is *Your Computer's* software downloading service. Any program for the Spectrum or the BBC — and soon the Commodore — which has a telephone symbol next to it is available on the service. Both 1200 and 300 baud speeds are catered for. For more details call Colchester (0206) 8068. No more lonely nights typing in endless pages of hex digits.

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YOUR Letters

(continued from page 17)

```
9000 FOR f = 1 to LEN a$:PRINT
A$(f);:BEEP .05,0:NEXT f:RETURN
```

prints text newsflash style. It is meant to be used as a sub routine. To activate use LET a$ = "message to be printed.", then set the printing variables. For example:

```
PRINT AT x,y;
```

and

```
GOSUB 9000
```

I have noticed that the Spectrum has a facility to convert binary numbers to decimal but it doesn't have anything to convert decimal numbers to binary, so I have written a routine to serve this purpose. Poke the decimal number that you want to convert into location 16384, then run this routine:

```
1 LET a$ = "":FOR f = 0 to 7:LET
a$ = a$ + STR$(POINT(f,175):NEXT
f:PRINT a$:STOP
```

Neil Braganza,
Nailsea,
Avon.

SPRITES BUG

I HAVE just discovered a bug in the listing for my Sprite Basic article in the June issue which prevents the two commands !Break On and !Break Off from operating correctly. However, the bug can simply be cured by loading the machine code, and then running this program:

```
10 FOR J = 62780 TO 62650 STEP
 − 1
20 POKE J + 21,PEEK J: NEXT J
30 FOR J = 62650 TO 62670
40 READ N: POKE J,N: NEXT J
50 DATA 7,98,114,101,97,107,111,
110,166,237
60 DATA 8,98,114,101,97,107,111,
102,102,175,237
70 POKE 60136,208
80 SAVE "SPBASCODE" CODE
60000,2800
```

Robert Newman,
Oundle,
Peterborough.

HACKERS BAD

THE DEFENCE of electronic shoplifters — hackers — in your May Leader was quite touching, implying that all they are interested in is helping big business to tighten up the security of its computer systems.

If an intruder was apprehended in your office in front of your safe, which he had just opened, and he claimed that he was not really interested in the contents at all, but that all he was trying to do was to demonstrate to you that your security was lax, would you really just thank him kindly and send him on his way, perhaps with a reward for the kindness he had done you?

I think the naivety of your leader writer is surpassed only by that of the author of the *Hacker's Handbook* if he really believes what he wrote in the quotation you give from his book on page 49.

I. Howard Wright,
Sauchie,
Clackmannanshire.

SNAKES ALIVE TIP

THANK YOU for publishing my corrections for the game Snakes Alive! last month. I am pleased to say that it is now enterable, and should work straight away.

For those that are still having problems though, a couple of large checksums might help locate the source of your error. These are 417 851 for listing 3 and 377 062 for listing 2. Just write a loop to add up all the contents from 28384 to 32767 inclusive, and these two numbers should be returned for their respective listings.

For those that have successfully typed in all the code, congratulations!!

If you are having problems guiding the snake around all 48 locations, here are a couple of "cheating" Pokes that should (only for a while!) make things easier:

POKE 25803, any number from 1 to 256 (poked as 0). This is the initial SPEED value. Note that it is actually a two byte variable, and large values will be very slow — avoid them! The first byte, at 25802 should only be POKEd with caution — it must always be a multiple of four. Normal value for the second byte is seven.

POKE 25797, any number corresponding to a character from 1-9 (ie 49-57). This is the initial number of LIVES.

These POKEs should be typed after loading in the finalised code.

These should make things easier for those weak souled people who can't stand the challenge. (Or those like me that just aren't fast enough!)

To cater for those who have bought cassettes off me, the same two effects are achieved by holding down keys D and A while the last block of the normal load version loads. You will then be prompted.

D.R. Aspinall,
Brentwood,
Essex.

BITS 'N' BOBS

Line 2510 in June's Amstrad program, Engelbert, is unclear. The last statement should read:

PRINT "✱# @@!!";

The Spectrum and CBM 64 listings in June's Top Tips managed to get themselves mixed up. And on top of this D. Rockley's listing — for the Spectrum — contains an error in line 50, The USR address should read 64721, not 64271.

Lastly, line 65480, Listing 2 of June's Spectrum program Wizard's Den, reads:

65480: 003C424242423C00 = 384

ARE WE UNDERMINING THE ORGANISATION?

MAY I, as a headmaster of a large comprehensive school whose library accepts your magazine *Your Computer*, complain in the strongest possible way about the June edition.



On page 51, where in the bottom left hand corner you claim no responsibility for what you print, you make two comments which are obviously aimed to undermine the organisation of both schools and examination boards:

(i) "... which might help you break into the computers that store examination records".

(ii) "when you send your idea, ..., for cheating in an exam or pulling off a scam ...".

We feel very strongly at this school that your magazine should not be allowed to be on display in our library if such comments are to be repeated in future editions.

JW Barrett,
The Lindsey School,
Cleethorpes.

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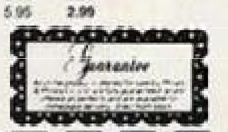
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So why not have a crack at this month's competition and Peek and Poke your way to a £15 prize? Write a short, or shortish, program which creates an animated display by Poking to the screen memory.

Spectrum and Amstrad owners will be at a disadvantage here sinnce John Ransley does not talk about bit-mapped displays; the program he gives as an example will only work on micros whose screen memory operates on character codes.

By contrast, the Spectrum's screen memory controls individual pixels not characters. Nonetheless many of the same principles apply but you might need to study your manual first.

Marc Kavanagh, 13 Barber Street, Padfield, via Hyde, Cheshire SK14 7EG, wins May's competition. He neatly illustrates the use of nested loops with a program to print out three, four and five letter word anagrams.

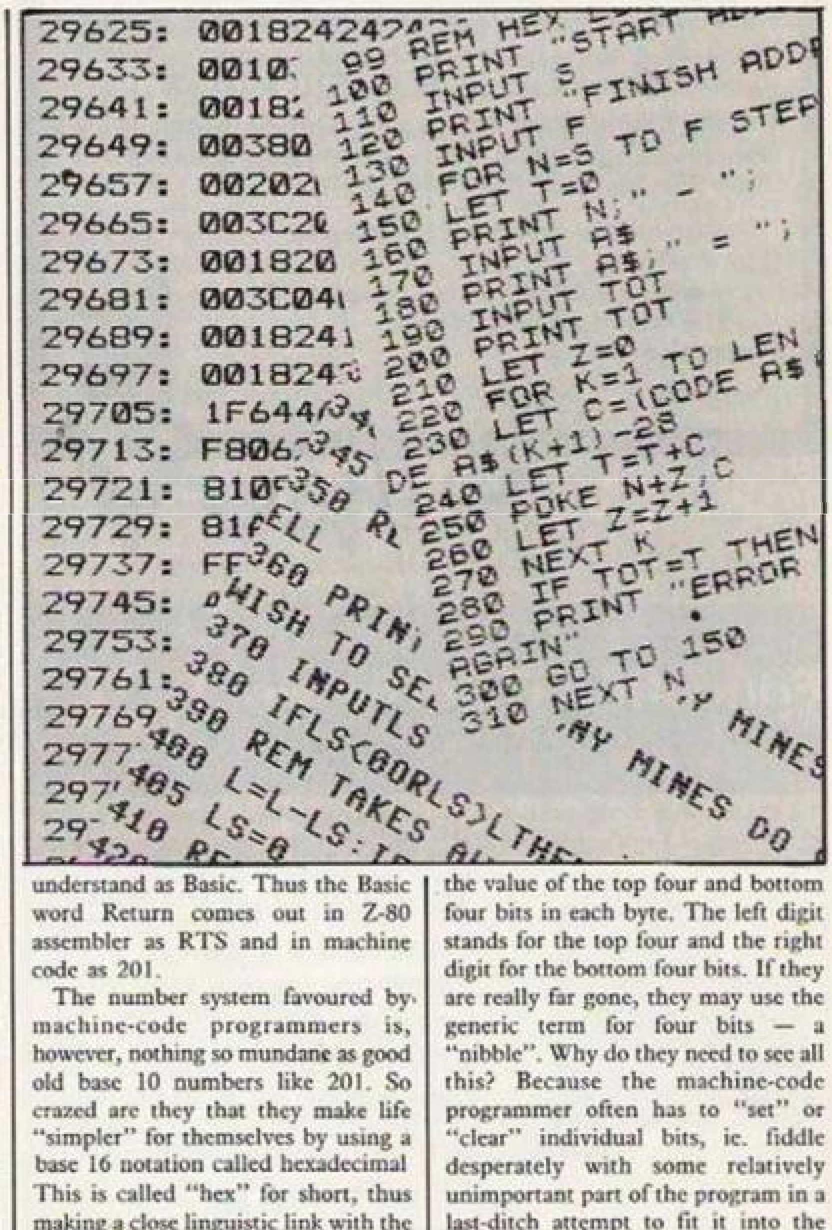
The program can be easily expanded to cope with larger anagrams by altering line 80 and adding more loops. It is written for the Spectrum but will run on most other micros with minor alterations.

```
10 INPUT "ENTER THE ANAGRAM";A$
20 LET L=LEN A$: IF L<3 OR L>5 THEN GOTO 10
30 FOR A=1 TO L
40 FOR B=1 TO L
50 FOR C=1 TO L
60 FOR D=INT(L/4) TO L AND L>=4
70 FOR E=INT(L/5) TO L AND L>=5
80 IF A=B OR A=C OR A=D AND L>3 OR A=E AND L>3 OR B=C OR B=D AND L>3 OR B=E AND L>3 OR C=D AND L>3 OR C=E AND L>3 OR D=E AND L>3 THEN GOTO 120
90 IF L=3 THEN PRINT A$(A);A$(B);A$(C),
100 IF L=4 THEN PRINT A$(A);A$(B);A$(C);A$(D),
110 IF L=5 THEN PRINT A$(A);A$(B);A$(C);A$(D);A$(E),
120 NEXT E
130 NEXT D
140 NEXT C
150 NEXT B
160 NEXT A
>
```

BEGINNERS first bytes

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A bluffers' guide to micros



GUARANTEED 100 per cent pure machine code — this sort of crazed statement is made on the backs of obscure cheap-rate software packages which seem to be trying to foist themselves as some sort of silicon potcheen — guaranteed to blow your mind. You don't see it as much as you used to, but nevertheless the term "machine code" *has a powerful aura* for micro users familiar only with high-level language words like Load or Run.

Those are the sort of words that these wets have to know in order to play their favourite game, i.e. Ghostbusters or Moon Cresta. These people do not have the right stuff as far as real tough he-man programmers are concerned, even if they have a hi-score that looks like Terry Wogan's salary.

A high-level language is one that has human words in it, and it has an interpreter inside it which translates what you type into stuff the computer understands. This takes time, so it slows down programs, which is why machine-code hackers sneer at Basic programs — Basic is a high-level language. To be a real mainline programmer, you've got to speak to the machine in its own language.

You can fudge it by using a compiler — this is a separate program that will translate your whole program into machine code, so you feed the whole translation in instead. But it's like going to Spain on a package tour — you don't really get to know the natives. Anyway, compilers take up a lot of room in a home computer's memory, bashing elbows with the original Basic program and the resulting machine code. Most hard-core hackers take pride in being able to optimise code better than any "dumb compiler."

You can compromise by writing in assembly language using a special program called an assembler, that translates assembly language into machine code. This uses mnemonics which are a bit more comprehensible than machine code but not as easy to understand as Basic. Thus the Basic word Return comes out in Z-80 assembler as RTS and in machine code as 201.

The number system favoured by machine-code programmers is, however, nothing so mundane as good old base 10 numbers like 201. So crazed are they that they make life "simpler" for themselves by using a base 16 notation called hexadecimal This is called "hex" for short, thus making a close linguistic link with the old Pennsylvanian German dialect word meaning to practice witchcraft. The desire for supernatural control of events which all machine-code programmers harbour is thus clearly exposed — hence the use of terms like "machine-code wizards".

The 16 hexadecimal digits are usually represented by 0-9, A-F. So 10 in hexadecimal is A, written as OA for typographical reasons. And 201 becomes C9. Hex maniacs are very plausible. They will explain to those of the uninitiated who can be kept awake long enough that hex is "more convenient". You see, old chap, every single byte number between 0 and 255 can be expressed as two digits.

Hex allows you to see "at a glance" the value of the top four and bottom four bits in each byte. The left digit stands for the top four and the right digit for the bottom four bits. If they are really far gone, they may use the generic term for four bits — a "nibble". Why do they need to see all this? Because the machine-code programmer often has to "set" or "clear" individual bits, ie. fiddle desperately with some relatively unimportant part of the program in a last-ditch attempt to fit it into the computer's memory.

Many would-be programmers are daunted by all this gobbledygook. Some, believe it or not, become disheartened by the prospect of typing in long columns of "meaningless" letters and numbers and spending hours hunting for "bugs", as well as entertaining all their friends for hours on end by explaining the problem.

If this is how you feel, fear not. This is a rational reaction, even though you are interested in computers you need not feel ashamed of it. In closing, let me leave you with this thought: is a bit on the side really a euphemism for extra-marital hex?

Paul Bond.

(continued on page 23)

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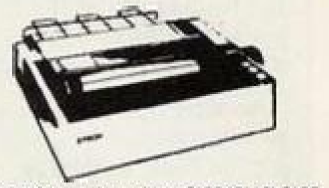
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(continued from page 21)

Scaling new peeks

BEGINNERS first bytes

PEEK AND Poke are — like Burke and Hare or Heffer and Skinner — names guaranteed to strike terror into the hearts of most God fearin' folk and certainly all novice programmers.

After all, when you've only just got the hang of making your screen display look something like the way you meant, after hours of juggling Print and Tab statements and a contagion of semi-colons, it's hardly surprising that you'd rather leave the mysteries of memory addresses alone.

But you'll have to tackle Peek and Poke some day, and there's no better way to start than by experimenting with the chunk of memory that controls your micro's screen display.

First, let's remind ourselves what the statements Peek and Poke really mean. Although every micro has a total memory expressed as 16K — that is, 16,000 bytes — 32K, 64K or whatever, some of that memory is gobbled up by the computer's operating system — including the Basic that makes it easy to write programs — so that in the Commodore 64, for example, just over 39K of Ram is left for your own Basic use.

Check out your micro's manual and you should be able to discover what chunk of Ram is swallowed up by the screen — and, possibly, colour — memory. The 64, for instance, offers a screen display "crossword" of 40 characters across and 25 down — a total of 1000 squares. Each square needs a byte to itself, and so its screen memory occupies the 1000 addresses from 1024 to 2023. Unlike some micros, the 64 needs a separate colour memory for each of those 1000 squares, and this squats at addresses 55296 to 56295. In the Commodore 16 and Plus/4 screen and colour memory run from 3072 to 4071 and 2048 to 3047 respectively. The Spectrum QL screen uses addresses 131072 to 163839, and the Amstrad CPC-464's screen memory occupies 49152 to 65535.

In the demos and program which follow, we'll cut down on finger fatigue by first declaring a variable equal to the first screen/colour memory address. For the Commodore 64, you'd need a line like this:

```
10 SM = 1024:CM = 55296
```

You can think of a block of addresses as a huge rack of cubby holes, such as you might see in a mail sorting office; all have glass doors so that you can see — or Peek — what is inside — but only some of them can be opened so that you may Place — or Poke — something into an empty one, or replace the existing contents with something else.

That "something else" is a different value in the range 0 to 255. In the case of a Poke to screen memory, you'll be using a value chosen from the ASCII — pronounced askey — or machine-specific table of screen codes representing the usual alphanumeric keyboard set as well as the special graphic symbols available on some micros.

Again, there should be a list of these in your manual; but be clear that



ASCII and screen codes are different again from the table of CHR$ values for the same characters. ASCII screen codes commonly run from 0 to 127 — with the alphabet beginning at 1 — with screen codes 128 to 255 usually producing the same character set in reverse field form. Now add these lines:

```
20 FOR L = 0 TO 9
40 POKE SM + L,1
50 NEXT L
```

These lines, as you'll see when you Run them, will serve to Poke the letter A into the first 10 screen memory addresses. They all now hold, of course, the value 1. Prove it:

```
60 PRINT:PRINT
70 FOR L = 0 TO 19
80 PRINT (PEEK(SM + L));
90 NEXT L
```

Run the whole program again, and after the As have appeared, the three new lines will cause the figure 1 to be printed the same number of times, and then you'll see 10 zeros. That's because the next 10 addresses in screen memory — in common with all the remainder — hold no value at all. Now alter line 40 to:

```
40 POKE SM + L,L
```

for a different result. Finally, enter in direct mode:

```
POKE SM + 5,32
```

and notice how this wipes the character held there, as a direct mode

```
PRINT (PEEK(SM + L))
```

will confirm.

To introduce a little colour into the proceedings, set your prime variables in 10 line as before and then type:

```
20 FOR L = 1 to 10
30 POKE CM + L,L
40 POKE SM + L,L
50 NEXT L
```

Colour codes are usually separately numbered from 0 to 15 or higher, so line 30 simply prints out the first 10 characters in the first 10 colours available. Incidentally, it's better to Poke colour before screen memory, otherwise you'll often get an untidy double image as each character appears; swop lines 30 and 40 to see this effect.

Using Pokes, this next routine produces a quite mesmerising, ever-changing kaleidoscopic display of all the characters and colours your keyboard can generate. It's also ideal for automatically generating sleeve designs for the Eurythmics: Line 20 declares the correct variables for a Commodore 64.

SC should equal your micro's maximum number of character-producing ASCII screen codes, CC the number of colour codes available, SL the total screen locations, and NC the maximum number of characters to a line; alter these variables as necessary to the equivalents on your micro:

```
 10 PRINT (CLEAR SCREEN)
 20 SM = 1024:CM = 55296:
    SC = 255:CC = 15: SL = 1000:
    NC = 40
 30 F1 = INT(RND(1)*SC) + 1
 40 F2 = INT(RND(1)*10) + 1
 50 F3 = INT(RND(1)*NC*2)) + 1
 60 F4 = INT(RND(1)*CC)*1
 70 FOR L = 1 TO SL STEP F3
 80 POKE CM + F2 + L,F4
 90 POKE SM + F2 + L,F1
100 NEXT L
110 GOTO 30
```

You'll find that the best effect is achieved by adding to line 10 your own micro's comands for setting the screen and border colour to white.

John Ransley.

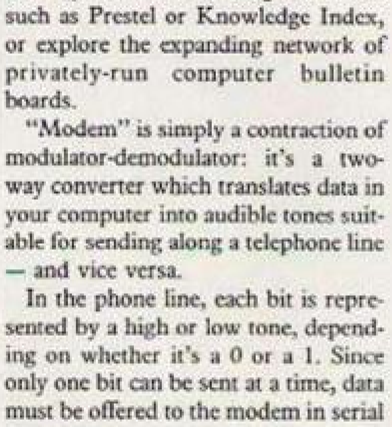
Modems — the whys and wherefores

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"Modem" is simply a contraction of modulator-demodulator: it's a two-way converter which translates data in your computer into audible tones suitable for sending along a telephone line — and vice versa.

In the phone line, each bit is represented by a high or low tone, depending on whether it's a 0 or a 1. Since only one bit can be sent at a time, data must be offered to the modem in serial



form. So you can't plug in to an ordinary modem unless your computer has a serial port. However, for many popular computers you can get special interfaces or communications packs which take care of the problem.

Among the cheapest modems are the sort known as acoustic couplers. These have rubber cups into which you press your telephone handset when you hear the distant computer answer your call.

Unfortunately, acoustic couplers tend to pick up room noise, which can corrupt the data. So unless portability matters, you may prefer the more reliable direct-connect modem, which plugs into a standard telephone socket. If you haven't got these at home, British Telecom can fit them.

In choosing a modem, decide first which services you're interested in. Several different signalling standards



— or tone combinations — are in use; and you can either pick a modem to match or pay more to have a multi-standard modem.

Perhaps the commonest standard now is the viewdata format used by Prestel, which sends data to you at 1200 baud and expects your replies at 75 baud. The figures denote the speed of transmission: in this context, you can take them to mean bits per second.

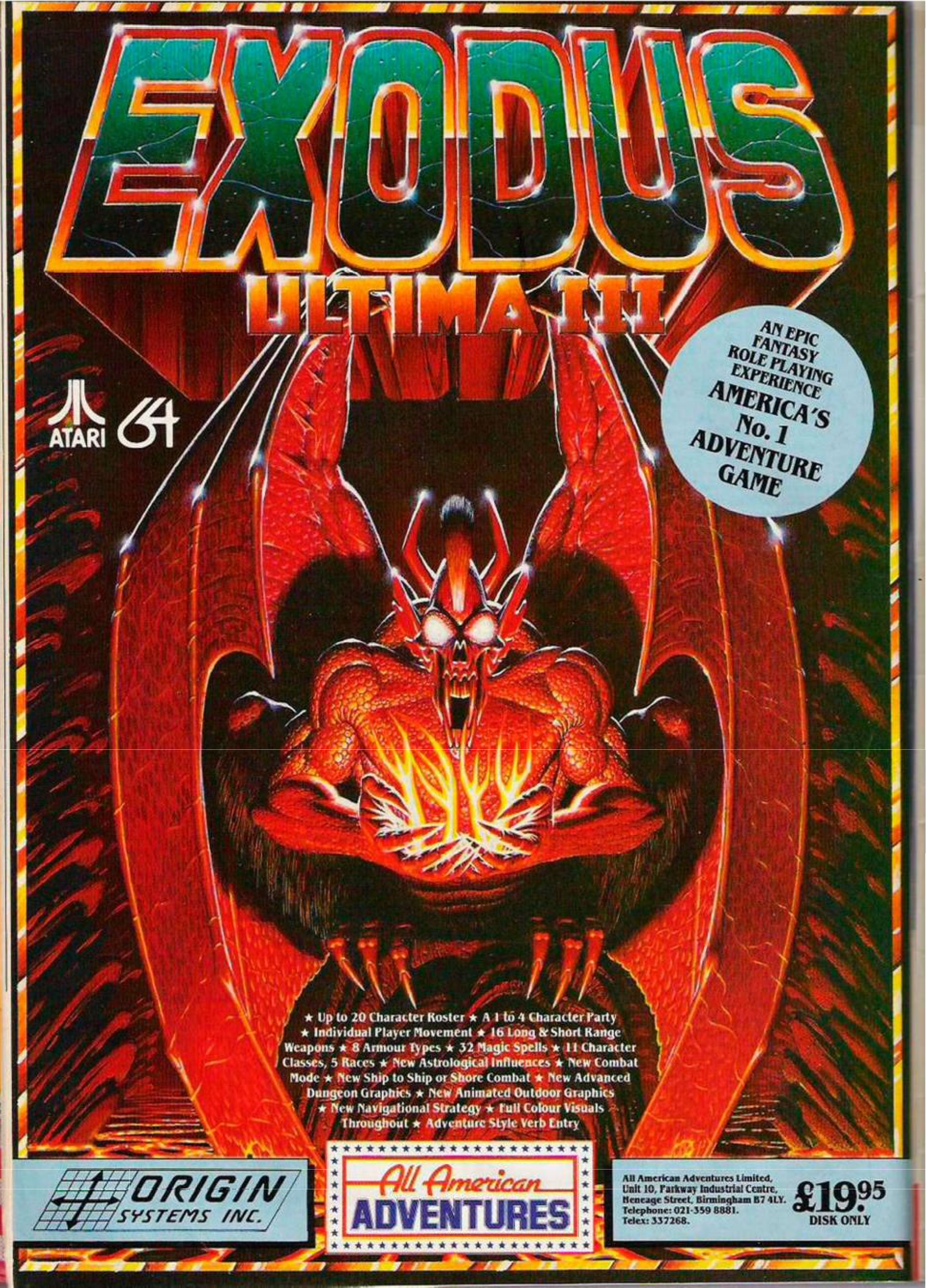
Each byte you send has to be gift-wrapped with start and stop bits, making up 10 bits or so altogether. So even 75 baud works out a lot faster than you can type!

Some bulletin boards today accept 1200/75 tones, but more usual is the 300/300 baud standard — often referred to in technical jargon as V.21; the viewdata standard is V.23.

To use a modem, you need communications software. Its basic function is to re-route the data paths in your computer: characters from the keyboard must be diverted to the serial port, characters received from the modem must be sent to the screen.

Details of viewdata packages for a wide range of home and business micros are available from Micronet 800, Durrant House, 8 Herbal Hill, London EC1R 5EJ, telephone 01-278 3143.

Richard Lambley.



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HARDWARE hitlist

ADD-ON EXTRA

Pacesetters

Joystick interface
Spectrum
£14.95
Nidd Valley Micro

Two joystick interfaces are available, one which uses the Kempston protocol, and, for ten pounds more, a software programmable interface. Both these devices incorporate the company's patented "slomo" slow motion device, which allows you to play game at any speed.

The Connection

Printer interface
Commodore
£79.95
Tymac

Rather on the steep side, this interface plugs into the serial port, and allows the Commodore to be interfaced with any parallel computer. Different versions are available to cope with the graphics commands of various printers. The company claims that the interface is compatible with all software that expects a Commodore printer to be connected. Tel 021 327 6637.

Tape care kit

Global software
Various
£9.95

Two parts to this kit, azimuth alignment and head cleaner/demagnitizer. The azimuth tape constantly monitors the number of errors detected while the tape is running, so alignment occurs when you get fewest errors. Cleaner is of the usual fabric type. A promising start from this new software company. Tel 01-228 6730.

Azimuth head alignment

Interceptor
Amstrad 464
£8.99

Following up their successful alignment tape for the C64, Interceptor are going for the Amstrad. An invaluable device, as so many "faulty" commercial tapes turn out to merely have alignment problems.

Dot Matrix Printers

- *Star*
- *£259 upwards*

SAY THE WORD "printer" to the average home computer user, and the chances are he'll think of Epson, for so long the dominant force in the printer market. With this new range of printers, Star hope to make some kind of inroad into this market.

The range consists of three dot matrix printers aimed at the home user; the SG10 at £259, the SD10 at £389 and the SG15 also at £389. They are either Epson or IBM compatible, and offer an attractive near letter quality font and a removable tractor unit. The DIP switches for selecting character sets etc. are easy to get at, usually on the left hand side, a major improvement over Epson's hiding them away inside. In the software, Star have come up with a neat idea, you can define a printer macro, once you define a series of often used commands, you can execute them by just sending the macro command. Perhaps this might have been more useful if several macros could have been defined. The SG and SD10 printers are both eighty columns with speeds of 120 and 160 cps respectively and 2k (just over half a page) buffers as standard, expandable to 6k. The SG15 is 136 columns, at 120 cps and has a 16k buffer as standard. The SD10 uses a ribbon cartridge, the SG's, typewriter style ribbons.



Star printers.

So how do they compare? Well, in use, they seem rugged and reliable. Noise levels were reasonable, the paper feed reliable and precise. The only slight quibbles are that the paper guides are a bit clumsy and the paper tear off is a long way from the print head, which means after doing a form feed after printing your document, you've still got to move the paper by hand before tearing it off. Certainly anyone looking at a printer in this sort of price range should carefully consider this bunch.

Valiant Turtle

- *Spectrum/BBC/CBM 64*
- *Valiant Designs*
- *£215 for home users, £201 for schools*

THERE ARE at least half a dozen different makes of turtle on the market but Valiant Design's product has already established itself as a rather superior turtle. Primarily intended for use in schools, it has two features that make it especially attractive to children. First it looks more turtle-like than most of its competitors. As well as legs, a shell, and a head, it even has a pair of red LEDs for eyes.

Second, it is not hampered by wires and cables but can roam free under the remote control of an infra-red transmitter. This device connects to your micro by either a serial or parallel lead, and gives the turtle a range of up to six metres. Power is provided by nickel cadmium batteries.

On top of this the turtle appears to be both robust and accurate; sufficiently accurate in fact to double up as a simple plotter. Its main use, however, will be to create turtle graphics in conjunction with Logo. Although the turtle pack does not include Logo it supports most versions of the language currently available. For more details ring Valiant Designs Ltd, 01 720 3947/627 1351.



Valiant turtle.

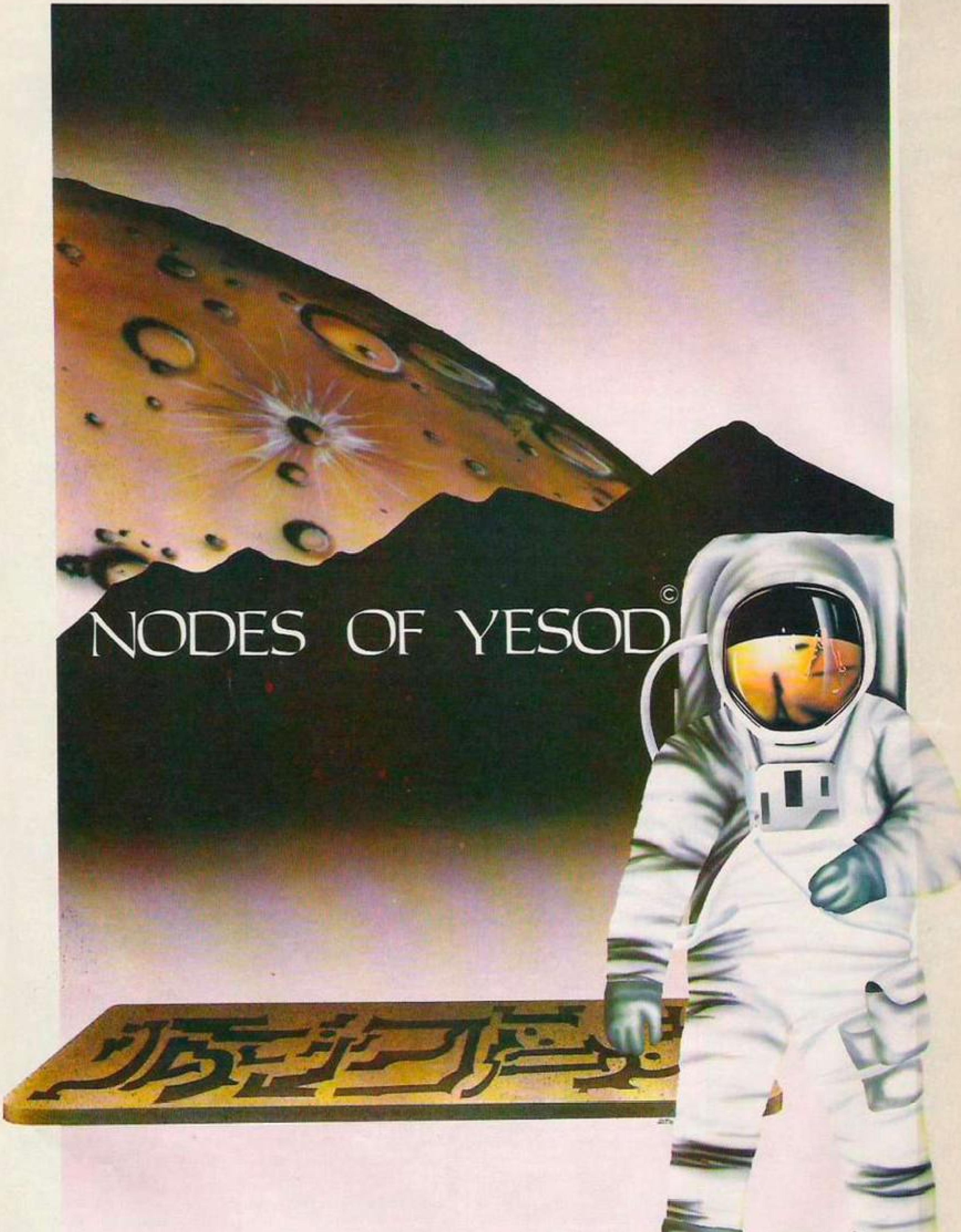
Interface III

- *Spectrum*
- *Evesham Micro*
- *£39.95*

IT HAD TO come, the ultimate copier against which there seems little possibility of protection. But of course, you would only use it for copying your own software to Microdrive wouldn't you?

Hardly elegant, this unit uses the sledgehammer approach to cracking the nut of software protection. After you have loaded in the game, you simply hit a button on the unit, which plugs into the back of the Spectrum, and it simply dumps the entire contents of Ram out the cassette port.

It also gives you the option of loading the screen display (important if machine code has been hidden in the screen area). Skipping this will mean that the program will take up about 5 sectors, so you can get two games onto one cartridge. The obvious disadvantage is that no matter how short the program is it will take up about the same amount of space.


NODES OF YESOD©

Star★chart

On-Court Tennis

CBM-64
Activision
Tennis simulation
£10.99

★★★

Good quality simulation — as with the quarter backs in this company's football game, the tennis players have individual personalities, so Ivan Messier has a great serve and plenty of endurance, but Jimmy Orr sometimes wears a bit thin.

Didn't actually throw his racket at anyone while I was playing. You can select surfaces to play on.

On-Field Football

CBM-64
Activision
US football simulation
£10.99

★★★

At first glance this looks like a game of table football — same overhead view. But this game has all the jargon and complexity of the real thing, without the popcorn and the cheer-leaders. You choose your starting quarterback, wide receiver, and tight end to fine tune your offensive strategy. You can even bring in substitutes. If you don't understand what all this means, then buy this game and catch up with Nicky Horne.

Quackshot

Spectrum
Creative Sparks
Arcade adventure
£2.95

★★★

No prizes for innovation, but value for money at the Sparklers economy price. A Tutankhamunesque maze game in which you, nightwatchman in the Acme Clockwork Toy Factory, are confronted by rampaging clockwork ducks. Armed with duckbuster bombs and stun gun you must fight them and the green snakes off. As with Tutankhamun you have to collect keys to move between levels.

SOFTWARE Shortlist

The Artist

- *Spectrum*
- *Softek*
- *Graphics utility*
- *£12.95*

★★★★★

SELL YOUR Macintosh. That's what ex-Volvo assembly line worker turned full-time programmer Bo Langeborg suggests people will be able to do once they've loaded his new program into a Spectrum.

There are even plans afoot to market this program with a mouse for the Spectrum. But at the moment you have to get by with five fingers to move the cursor. When the program has loaded you are confronted with an empty screen and two flashing cursors, one square, one cross-shaped.

You can get straight into some sort of Mac type painting by selecting a paint-brush and a brush pattern. At the base of the screen you have a choice of eight special commands — apart from brush and brush pattern these include a text option, a view command which shows you the whole screen without the commands, a move option which enables you to raise the screen so you can work on the base of the picture but still see the commands, a clear-screen option, a storage and a character creation option.

The reason you need five fingers is that apart from the directional controls of the brush you need to keep your thumb on the C key which sets the pixels on the screen.

By pressing the symbol shift key you can move between two sets of other commands, pixel setting commands and colour setting commands. The pixel command section has some very powerful commands. You can enlarge sections of the screen. You have instantaneous box and circle commands.

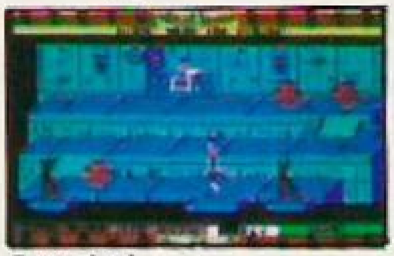
This section also has an overlay command which is comparable to placing a plastic sheet on top of a picture and copying it.

The colour commands open up a window around the cursor and the cross. Inside it ink, paper brightness and flash can be set separately.

Paul Bond



The Artist.



Entombed.

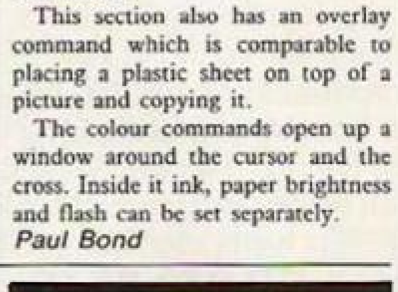
Elidon

- *CBM-64*
- *Orpheus*
- *Arcade adventure*
- *£7.99*

★★★★

PLENTY OF whimsy in the software market this month. We are treated to a trip to fairyland in Elidon. The beautiful graphics depict a hapless flower fairy as she tries to collect seven bottles of magic potion followed by pouring the bottles on to magic flowers in order to revive the magic garland to its former glory.

On her way she is hindered by tree-spirits, flames, strange bundles of energy and eerie darkened rooms peopled by things with glowing eyes. A fir cone, a leaf, a crabapple — any of these will help her ward off the unwelcome attentions of the evil spirits. There are also lucky horse shoes to be found for bonus points. But do not pick up the ones which are upside down, for of course all the luck will have drained out of them and they will kill you.



Elidon.

It's possible to pick up a torch to guide the fairy through the darkened rooms and she needs all the help she can get for her V/STOL capability is easily upset by the slightest bump. It is possible to get her to hover by judicious use of the fire button.

There are also forcefields which can only be penetrated by the aid of a horn or a set of pan pipes.

And in this exciting Ultimatesque game, your little fairy is going to need all the angel dust she can get.

Paul Bond

Entombed

- *C64*
- *Ultimate*
- *Arcade*
- *£7.95*

★★

THERE IS ALWAYS a buzz of expectation whenever a new Ultimate title comes along. With a string of hits like Knightlore, Underwurlde and Alien 8 under their belt, we've come to expect something rather special from them. Entombed is set in Egypt, where our intrepid explorer, Sir Arthur Pendragon, is entombed beneath the Sphinx, searching for the scrolls which will help him get out of this tricky spot.

The screen display shows a Scarab on the wall's view of Sir Arthur wandering about the corridors. There are two varieties of screens, scrolling, maze-like corridors and rooms where the various objects of your quest lie. The walls of the corridors are nicely done, covered in hieroglyphics. Apart from the scrolls, there are two objects you collect of more immediate value, a whip and a torch.

The problem is, the whole thing is rather sterile and predictable. In the corridors, you are constantly being irritated by things materialising and attacking you as you try to map out the maze. The rooms are too small to pose an interesting challenge like Manic Miner and clones, and the solution is normally irritatingly trivial. Nothing constructive in the way of hidden clues is done with the hieroglyphics, the nasties in the corridor are just plain irritating and time consuming.

A pity, but not really up to the high standards we have come to expect. This game was actually written by a bunch called ACS and marketed under the Ultimate lable, they would do better to stick to the Spectrum and their in-house programmers.

Lee Paddon.

(continued on page 29)



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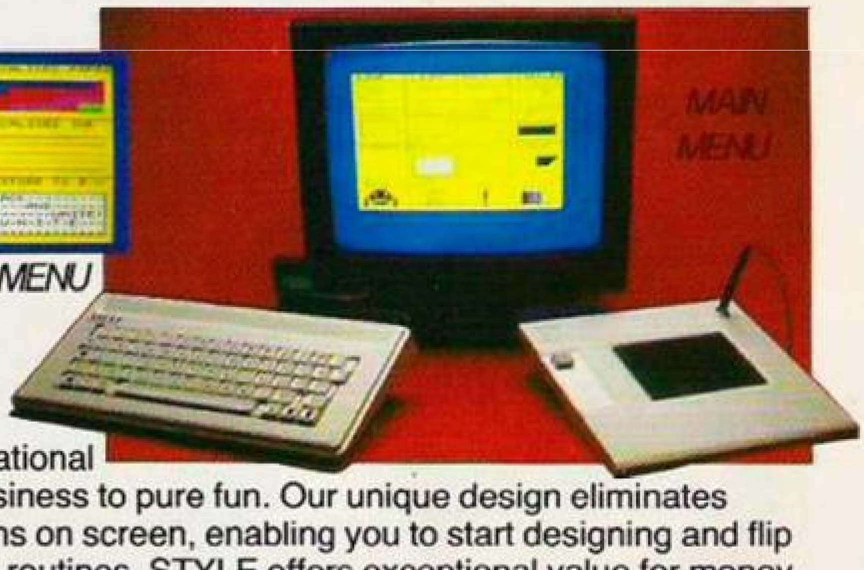




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Star★chart

Flip!

BBC
Strategy word game
Icon
£7.95

★ ★ ★

J S Bach meets Ghostbusters; Mozart clashes with Teddy-bears' Picnic. In Icon's Pelmanism-cum-word game, classical compositions mix with modern classics and classy graphics.

To score points you have to flip over the boxes to reveal matching pairs of graphics — Pac-Man, a Space Invader and a teddy-bear to name but three of the 15-odd characters on the 4-by-10 grid.

As each box flips over you see the animated graphic and hear a snatch of its theme tune; find its partner and you hear the rest of the musical phrase. Behind the correctly paired boxes are fragments of letters which go together to spell a word. That's the second part of the game.

It's a race to identify the hidden word. But in the two-player game rash guesses made too early only give points to your opponent.

Ghettoblaster

CBM-64
Virgin
Arcade adventure
£8.95

★ ★ ★

Rockin' Rodney — no relation to Rankin' Rodney in Taskset's Jammin' — has to shop for batteries and search for a tape to put in his FBR (frightfully big radio).

Then press F5 and you will hear the beat. The aim of the game is to successfully deliver 10 tapes to Interdisc Records. Meantime he can press the firebutton and fire notes at people to make them liven up.

A good game with some humour — street names like Electric Avenue get in, as do hippy anomalies like the Doors' Moonlight Drive and Love Street. Bob Dylan gets most streets into this game.

(continued from page 27)

Charlie and the Chocolate Factory

- *Spectrum*
- *Hill MacGibbon*
- *Arcade adventure*
- *£9.95*

★ ★ ★

JUST IMAGINE that! A whole day inside an enormous chocolate factory! And not just any old enormous chocolate factory! No, it's Wonka's Factory, where they make marshmallows that taste of violets, and chewing gum that never loses its flavour.

This is the prize that Charlie Bucket wins when he finds a golden ticket in a Wonka's chocolate bar. And this is the plot of Roald Dahl's scrumptious book, *Charlie and the Chocolate Factory*. Now those lovely people at Hill MacGibbon have turned it into a yummy computer game.

The primary game is split into four sections based on the plight of individuals who fall foul of the Chocolate Factory in the best moralistic way. Augustus Gloop whose face is like a monstrous ball of dough with two tiny currant eyes peeping out, becomes a purple blob in one of the sweet machines. Depicted in a maze of pipelines on the Spectrum screen, you must move Charlie backwards and forwards at the base of the screen, twisting pipes until Augustus is safely decanted into a flask. Otherwise he emerges from an open pipe as a sticky cloud.

The next section has Violet Beauregarde menaced by bouncing blueberries. Basically a breakout-style format you use keys 6, 7, 8 and 9 to move Violet around and get her shield to fend off the ferocious fruit. The idea is to bounce berries into a juicer, or else.

The fourth section confronts television addict Mike Teavee with TV cameras. Their deadly rays can only be counteracted by eating Wonka bars.

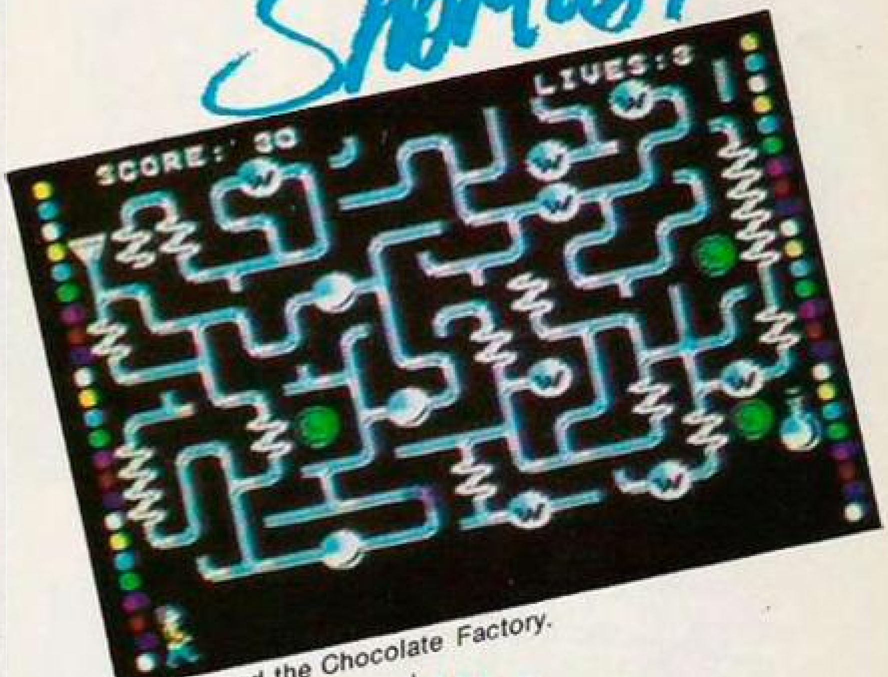
In the third section Veruca Salt has enraged the squirrels in the nut room. They want to chuck her out with all the other rubbish. She tries to leave poison nuts in their path, but these fade away quickly.

A nice touch is that you can practice each section without having to play the whole game, but if you rescue Charlie's companions in the primary game, then you will be given the code you need to help Charlie find the six gold keys in the chocolate factory.

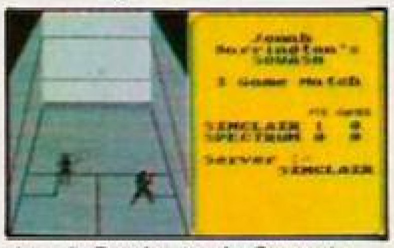
And this leads you to a whole new game on the flip-side of the cassette. This would seem to be a game in the style of Manic Miner, with 43 challenging rooms to explore, in order that Charlie can enter the Great Glass Lift.

Paul Bond.

SOFTWARE Shortlist



Charlie and the Chocolate Factory.



Jonah Barrington's Squash.

Jonah Barrington's Squash

- *Spectrum*
- *Simulation*
- *New Generation Software*
- *£7.95*

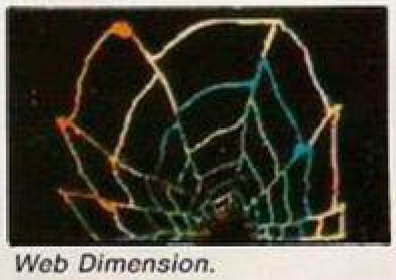
★ ★ ★

JONAH BARRINGTON'S (he is a famous squash player) Squash can be played against another human, or against the computer.

There are four difficulty levels, just as there are four ball spot colours in squash, ranging from red (easy) to yellow (difficult). The screen display is split in two sections with a three-dimensional representation of the game on the left hand side of the screen.

Hitting the fire button makes your player do a forehand or a backhand stroke, depending on the position of the ball when the button is pressed. So by careful timing you can alter the angle at which the ball leaves the racquet.

Paul Bond



Web Dimension.

Web Dimension

- *Commodore 64*
- *Ecological game*
- *£10.99*

★ ★ ★

THE SCREEN DISPLAY shows a complex section of a web. Life-forms drift aimlessly about the web. Pressing the fire button you must move your sprite — a musical note — along the webways, being careful not to touch the glowing ones.

Using the music you can freeze the life-forms at the nodes of the web. Once they are all frozen, the second stage starts.

In this stage you must stabilise the creatures, which are in the form of coruscating stars at the transitional phase. Then you see the next stage of evolution.

Paul Bond.

A View To A Kill

- *CBM-64*
- *Arcade adventure*
- *Domark*
- *£10.99*

★ ★ ★

THE GAME attempts to faithfully replicate three major action sequences from the movie.

The top half of the screen gives you a thee-dimensional view a la Monster Maze of the streets. The lower half is an over head map view of Paris. A tracking bleeper indicate proximity of target.

Next, Bond's girlfriend who has the unlikely name of Stacy is trapped in a lift. Zorin has torched the building.

Essentially a platform game, the programmers have included a rather ingenious lookdown facility in the third stage.

Paul Bond

(continued on page 31)

SOFTWARE Shortlist

Star chart

Beeline

BBC
Robico
£5.50
Maze game

★ ★ ★

Hank is a blue bee who explodes when he gets angry or tired. Your mission is to guide him to his beehive. Watch out for energy-sapping toadstools, spiders, faces, insecticide cans and the lizard's tongue.

Meanwhile, collect pollen grains, flowers, apples, honey pots and bowls of water.

Bulge

Spectrum/CBM-64
Lothlorien/ASP
£9.99
Wargame

★ ★

After the bouquets last month for Arnhem from CCS, it's time for the brickbats. To say that this is an improvement on Lothlorien's previous effort, Panzer Attack, would be true but would be no recommendation. It is in real time, and as the German commander, you simply haven't got time to issue all the orders you need to. As the game progresses and units get spread far and wide, you spend most of your time chasing round the map after errant units. Any bulge game which doesn't feature roads is doomed to failure.

Wetzone

BBC
Everiss Software
£6.95
Shoot 'em-up

★

An engaging little whimsy from the house set up by Imagine renegade Bruce Everiss. Lots of different things to shoot at and every so often a UFO whizzes across the screen. If you hit it you score extra points. Sounds familiar? It did to us. We conclude that Bruce is re-examining his roots rather like Eric Clapton returning to the blues, or Working Week re-assessing jazz.

(continued from page 29)

Contraption

- *BBC*
- *Platform*
- *Icon Software*
- *£8.95*

★ ★ ★ ★

GAMES programmers — or designers as they now like to be called — sometimes complain that reviewers do not play their games long enough to do them justice. Helen and David Mann, the authors of Icon's Contraption, need have no such fears: between them *Your Computer*'s games reviewers have racked up hours of playing time on this one. The game has inspired seasoned reviewers — veterans of scores of platform campaigns — to rise from their desks clamouring to be let at the keyboard.

As far as the plot is concerned the game is fairly conventional. You have to jump, bounce and scramble your way through 10 screens, picking up apples and avoiding such perils as floating bombs and toxic plants. But the course in each screen is particularly well constructed, and pitched at just about the right level of difficulty. At first sight it seems that you will never reach that vital ledge, or catch a lift from that floating coffee table. But once completed each screen is plain sailing the next time round.

However what really marks this platform game out as special is the superb use it makes of Mode 1 graphics. Adopting the Frak technique of outlining figures in black allows the designers to show all sorts of pleasingly inventive details which make most Mode 2 games look distinctly crude in comparison. Pipes actually look three-dimensional, bouncing valves gleam, and your little man is a real character study — a benign balding old timer clad in red Mao jacket which admirably sets off his tuft of ginger hair.
Simon Beesley.



Contraption.



Combat Leader.



Chopper.

Combat Leader

- *CBM-64*
- *Wargame*
- *U.S. Gold*
- *£9.95/£14.95*

★ ★ ★

COMPUTER wargames are big news in the states, and SSI are the big name. This offering from them, via US Gold, puts you in command of a company of mixed tanks and infantry, against a similar force commanded by the computer. There are seven different scenarios available, giving you a range of objectives, or you can choose a roll-your-own option where you can pick the forces you and the computer will control and the objectives. This option also allows you to specify the characteristics the vehicles will have, and to help you, some historical data is provided to allow you to pit Shermans against Tigers, or even, if you have a taste for the bizarre, Matildas against Sheridans.

There are eight different mixes of terrain, most thickly wooded, with the odd hill. A river with a bridge might have been nice, but you can't have everything.

The game plays quite smoothly. You issue orders to units by a combination of keyboard and joystick. The unit's response is then displayed. Units report their position, and that of any enemy units they see.

The game seems rather weighted against the poor bloody infantry, whom you would expect to do pretty well in this sort of terrain. Despite being equipped with anti-tank weapons, they tend to come off second best.

Tactics are minimal, advance under cover until you find the enemy, then fire like mad until one of you is dead. However, interest is maintained by the wide variety of missions you can try and you can have different mixes of forces, and different types.

Certainly a lot less trouble than setting up a miniatures game.

A good first attempt in a difficult field where everybody has their own theory about what constitutes "realism" and historical accuracy.
Lee Paddon.

Chopper

- *Creative Sparks*
- *CBM-64*
- *Scramble-type*
- *£2.50*

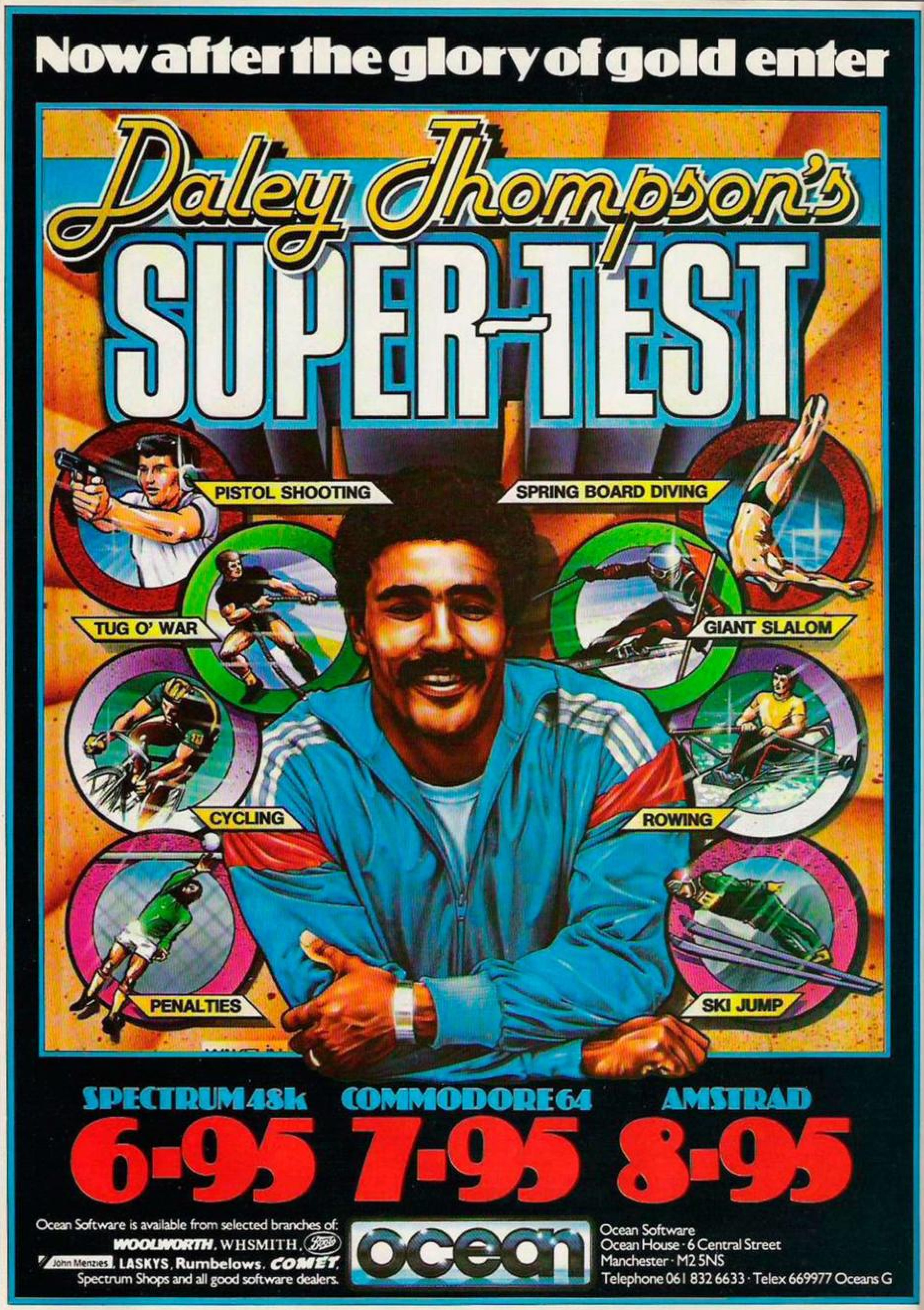
★ ★ ★

WORTH every penny of £2.50 this is another example of the Sparklers philosophy: "if you can't beat 'em, undercut 'em".

Instead of a spacecraft you fly a helicopter against oncoming hordes of hostile rotorcraft. The angry buzzing of a massed helicopter squadron is faithfully replicated by the 64 and is guaranteed to make the neighbours think you are shooting the sequel to *Apocalypse Now* in your living room. The drawback is that you are fixed to the right hand side of the screen and can only move up and down. You can't shoot when you're moving and vice versa.

On the second screen, which you achieve after a tricky refuelling sequence in which you have to rendez-

(continued on page 33)



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Star chart

Baseball

C64
Activision
Sport
£10.99
★ ★

A poor copy of the Imagine Baseball game reviewed a couple of months ago. You get to field and bat, when fielding you choose the ball you pitch and manipulate the fielders. As batsman, you choose when, and if, to swipe the ball. Only one view is given, from the perspective of the spectator, with none of the nice touches which made the Imagine version bareable, mind you, at least we are spared the ra-ra girlas at half-time.

Chicane

BBC
Kempston
£7.95
Racing game
★ ★

With absolutely phenomenal timing, Kempston launch a racing game hot on the heels of Acornsoft's "Revs". Unfortunately, this game is rather left in the pits with a dead engine compared to Revs. As a game, it is quite good, but a simulation it isn't. Steering, throttle, break and gear changes are all included. There are six different circuits to race round.

Theatre Europe

PSS
C64
£9.95
Wargame
★ ★ ★

Following on from their Midway game, this is set in the near future, when the treacherous Russians come charging over the North German Plain, bent on bringing the peace-loving west under their ruthless iron heel.

Behind this distasteful scenario is an even more distasteful game. Technically very well executed, the conventional battle is a dull slugging match.

(continued from page 31)

vous with a stratotanker, you are plunged headlong into the usual surreal mixture of balloons, ducks and what-have-you so beloved of the true sprite graphic craftsman. The ducks fly past in strict formation — the more ducks pass, the more points you get. But you will probably bend your rotors on an airship first.

If you survive to screen three, you will discover the purpose of your mission, which is to chuck bombs down horizontal airshafts to destroy the enemy base in the time-honoured way. The enemy whirlybirds contrive to get in your way and are practically invulnerable on this screen. If you like clenching your teeth and screaming, then this is the game for you.

Paul Bond.

SOFTWARE Shortlist

Taskmaster

- *CBM-64*
- *Shoot-'em-adventure*
- *Creative Sparks*
- *£2.50*

★ ★ ★

WITH excellent three-dimensional graphics and seven screens, this looks like the sort of game that US Gold was marketing for £14.95 a year ago. Maybe the programmers could have done a little more with the sound facility, but for £2.50 this example of the new Sparklers range from Creative Sparks is good value.

As the sun goes down on the first screen, the valley in front of the castle darkens and the zombies troop on like football supporters aimlessly wandering about and treading on you if you get in their way. Your man is armed with darts and you must keep blasting if you hope to see the second screen. This is the wizard of Dabbit Wood who appears at random and launches heat-seeking spells at you. Getting through this screen is more a matter of luck than good judgement — then you find yourself outside a cave in Vampire Mountain. You have to pick up four sacred statues and since your man is getting a big tired now he seems to walk more slowly and weave about. This is not good because bloodsucking bats issue forth from the mouth of the cave.

On the next screen our man is evidently getting into ancient history, as we find him by a stone circle. But the guardians of this creepy cromlech are the Devil Worshippers of the Temple of Demons — a bunch of trigger-happy mad monks. Undeterred — our hero winds up in the cemetery being assailed by ghouls. By this time I was so shellshocked I forgot to notice what the screens were actually called.

Paul Bond.



Taskmaster.



Magic Mushrooms.

Magic Mushrooms

- *BBC*
- *Platform game*
- *Acornsoft*
- *£12.95*

★ ★ ★

IF YOUR HEART sinks and a drowsy numbness steals over you at the mention of platform games Magic Mushrooms might be the antidote. It is a game in two parts, both a standard issue nine screen platformer and DIY platform construction kit. The halucinatory fungi in question are what you have to pick up along the way.

The ready-made screens are frustratingly difficult if not impossible; but at the point at which you are about to give up in despair you can press Escape — whereupon you move to the Edit screen. Along the top there is a menu of 15 items, among them escalators, monsters, crumbling and firm platforms, trampolines, and slides — all the items, in fact, that you would expect to find in a well stocked platform game.

It is now a simple matter to take out a troublesome monster or add a new stairway. Alternatively, you can give your imagination free rein by scrubbing one of the ready-made screens and building a new one. Either way, you can then save your creation.

If you are the one setting the traps and obstacles they probably will not present you with much of a challenge, although they may to others. But the real interest lies simply in designing new screens, an activity which turns out to be even more compelling than playing the game itself.

Peter Connor.

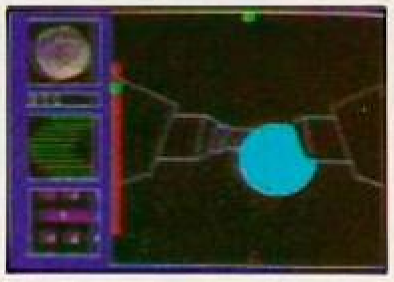
Gyron

- *Spectrum 48K*
- *Firebird*
- *Maze*
- *£9.95*

★ ★ ★ ★

AT FIRST YOU might look on this game as a maze game crossed with a shoot-'em-up, with some nice graphics. But this would be to dismiss a game which gradually grows on you. It is more reminiscent of Rubik's Cube than a run of the mill maze game.

The first thing that strikes you is the graphics. You pilot a ball, or Hedron, around a maze. The maze scrolls smoothly past you as you move down the three dimensional trenches. Control is achieved with cursor keys or joystick. Moving the joystick to one side or the other will move the Hedron across the trench, and, if opposite the opening of a side trench, the Gyron will turn the corner.



Gyron.

There are a number of spheres rolling around the place according to predetermined patterns. These, needless to say are deadly. Then there are the towers, these are a different kettle of fish all together. These are orientated in a particular direction, which you get from a small radar map of the neighbourhood. If you roll in front of these, you get shot.

Lee Paddon.


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QUEST Corner

Our man with the brass lamp and the key to a thousand mysteries sheds light on new adventure programs. Lost? Never fear, Hugo North is here.

NEWS
oaeo
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tttt
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The crystal ball

Incentive Software have released their popular Ket triology (Mountains of Ket, Temple of Vran and Final Mission) for Dragon owners. It comes on one cassette and costs £9.95.

Bored Of The Rings is an excellent parody adventure available on Microdrive or cassette for Spectrum owners. Mail order only from Delta 4 Software (04893 5800).

A helping hand

Fulvao Cerlesa of Rome is a great fan of English adventures. He had a spot of trouble with two of Scott Adams'.

In Spider-man:
Can't get the bio-gem
LLAH MORF MEGO IBTA BEWT OOHS
Electro a shocking problem?
ORTC ELEG NITT IHER OFEB SMRA S'KC OROT CODB ARG
In Sorcerer of Claymorgue Castle:
Can't open the book?
TFOL EHTM ORFT IPOR D
Battlement tin-can elusive?
KCIR BWOR HTNE HTLL EPSN AEDT SAC
Gary Blunden of Ongar can't shift the bear in Adventureland:
RAEB EHTT ALLE YTSU J
In Sutton Coldfield, M. Poynton is wrestling with Zork 1:
In the dark in the Drafty Room?
MOOR TFAH SMOR FTEK SABN ISTC EJBO REWO L
From Warrington, Andrew Parker is adrift in Zork 2.
What goes on the stands on the Wizard's workbench?
SERE HPSS SALG DERU OLOC EHTY RT
Yours in adventure adversity,
Hugo North

Key of Hope

- *Spectrum 48K*
- *Games Workshop*
- *£7.95*

Following on from the excellent Tower of Despair comes this latest atmospheric two-part text and graphics adventure from Games Workshop.

The adventure features over 400 locations — though only some are illustrated — and has beautifully designed manuscript-style text.

The White Goddess of Truth has requested your aid in the battle against the evil Malnor. You must collect the scattered pieces of the Key of Hope to defeat the Demonlord.

You begin, confused, at the ruins of Castle Argent. Nearby is a plain ring, a spirited, snow-white stallion and a glittering sunsteel sword. It's all too easy to get lost when you start to roam around but with luck you should find a talisman. Pity it's too hot to pick up, though.

You must find water quickly else your bones may soon lie bleaching in the sun and the search for the key over before it has barely begun. Your quest is definitely not going to be easy.

As before, a rich plot, plenty of locations and puzzles and fulsome prose. Highly recommended.

Mindshadow

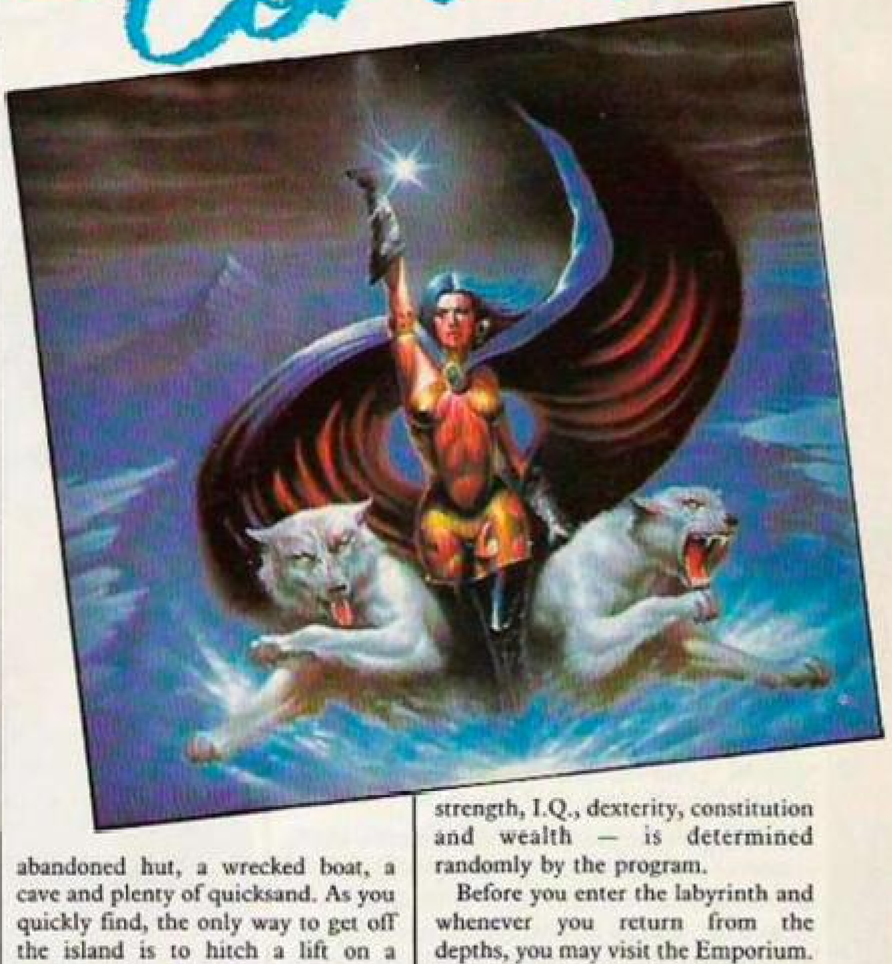
- *Commodore 64*
- *Activision*
- *£19.99 — disc only*

In Mindshadow, your aim is to find out your lost identity by working your way through a series of situations. The game sports some pretty impressive graphics of the locations but the adventure itself turns ou: to be a little on the dull side.

The early part of the game is set on a desert island. A little exploring soon uncovers such things as an abandoned hut, a wrecked boat, a cave and plenty of quicksand. As you quickly find, the only way to get off the island is to hitch a lift on a passing ship. Unless you've got a suitable bribe, the captain won't take you.

The adventure has a sophisticated command analyser and a wide vocabulary. Help is available by calling on a giant condor (I can't think why) who may assist you up to three times.

Not bad but at the price I can't see many people buying it.



Tyrann

- *Oric/Atmos*
- *No Man's Land*

Confirming the popularity of the Oric/Atmos with the French, here comes a Dungeons and Dragons type adventure imported from across the Channel.

Don't fret that you'll need GCE 'O' Level French to play the game — apart from a few system messages like "Un instant svp" and "Chargement en course" — Loading in progress, I presume — all text is in English.

The aim of the game is to guide a band of six characters through a large, monster-inhabited labyrinth. Your ultimate mission is left unstated. At the start of the game, you select and name your group from six types: each character can be a warrior, magician, thief or druid. Their quality of their abilities — strength, I.Q., dexterity, constitution and wealth — is determined randomly by the program.

Before you enter the labyrinth and whenever you return from the depths, you may visit the Emporium. Provided you have sufficient money, you can equip your party with various items such as weapons, armour, phials, parchments and spell books. Included in the list of 25 objects on offer are a white mouse and a baby dragon!

While above ground, you may also sell, swap or leave items and pay a visit to the Great Alchemist — who is excellent at First Aid.

Once in the maze, the display shows a stylised 3D view of the path ahead. Nothing visually exciting about this, just the usual perspective line drawings of walls and doors. As you move left, right or forward, the picture is updated.

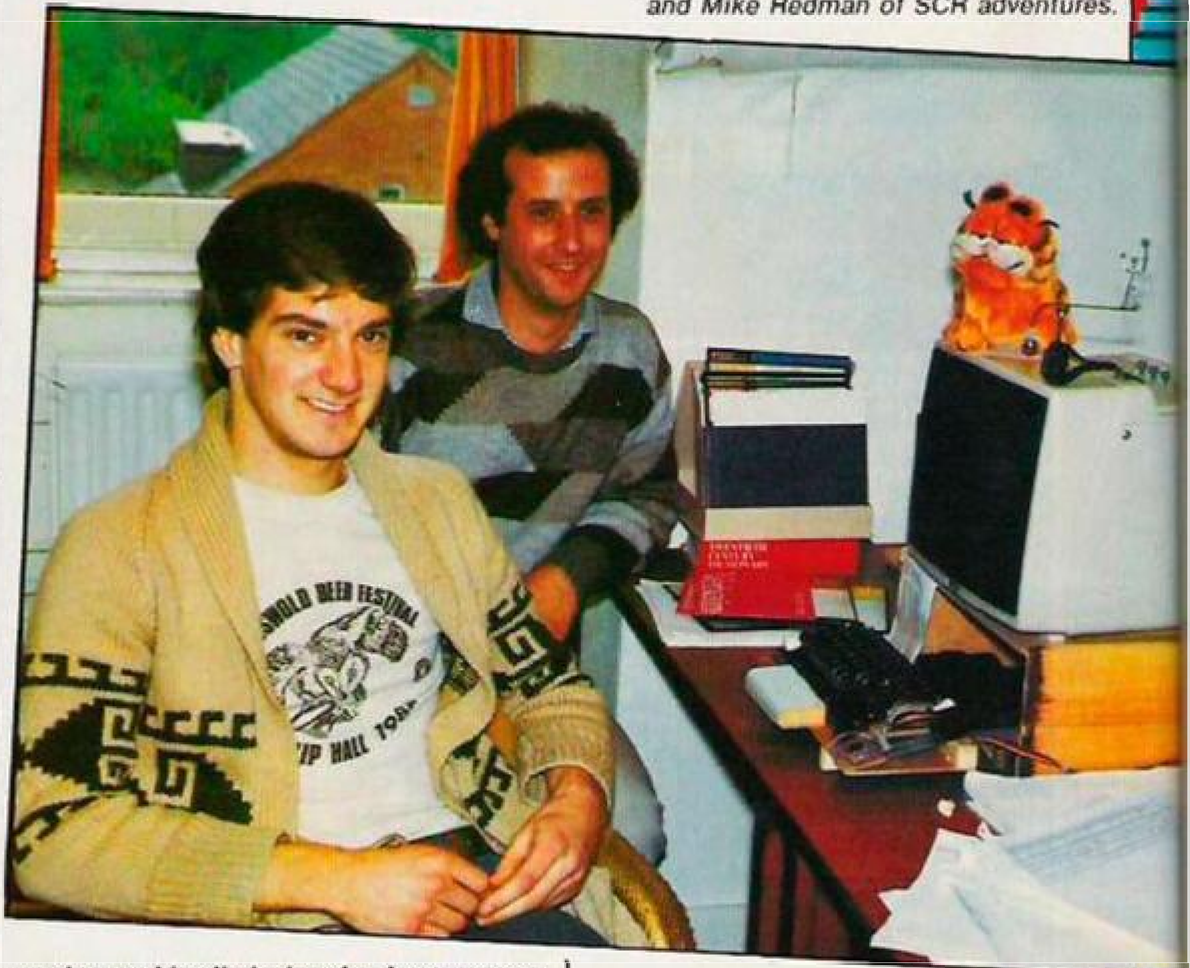
The party may elect to camp and in so doing you can choose to catch 40 winks or inspect the current status of any member.

Apart from strolling round the maze, the only other activity is fighting. When you meet a group of monsters — they mostly come in groups and are only shown by name, not pictures — each character is given the option of parrying, fighting casting a spell or running for their life. Each round of the battle is then described. When all your band is killed, the game is over — but you can bring all of them back to life and start again.

Use of sound and graphics is minimal and the game content and format is hardly original.

BEATING THE YANKS AT THEIR OWN GAME

Mark Shepherd, in beer swilling T-shirt, and Mike Redman of SCR adventures.



James Hartley discovers that the British are doing well in the latest software war against the U.S.A.

THERE'S A MAN dressed up as a werewolf in one of Infocom's latest adventures. You might bump into him in the kitchen, or find him sidling up to you by the fireplace in the living-room for a chat. If he does, you might discover that he is married to that charming lady you met only a few minutes earlier at this high-society fancy dress ball. That lady is now lying dead in one of the adjoining rooms, strangled by the lariat from *your* costume and victim of a hideous crime in which you are the prime suspect.

Suspect, as the game is called, boasts a whole crowd of characters like the werewolf, most of whom you can communicate with in one way or another, and all of whom seem quite capable of going about their business quite independently of you, the player. The game is typical of a whole new generation of text-only adventures that are beginning to make some of our British adventures look pretty silly. If you've been introduced to Infocom — and it'll cost you upwards of £40 plus the disc drive to run the program on — then you'll understand immediately why Douglas Adams worked with Infocom on his excellent computer version of *Hitch-Hiker's Guide to the Galaxy.*

Different in a year or two

The reasons why Adams worked with Infocom are fairly obvious — a top-class software house working in an enormous domestic market — but in a year or two things will be quite different. British adventure programmers are fighting back and are now racing to develop new game systems that could end up making even Infocom look pale by comparison.

The main problem to date has been the hardware. Here in Britain hardly anybody has disc drives that can provide the sort of data storage needed for really complex games, and, unlike in the U.S.A., machines with larger memories, like the IBM, are scarcely thought of as *personal* computers. But, paradoxically, it's limitations like these that are now providing the basis for a new push forward in British adventure software.

"It's been very frustrating", says Pete Austin of Level 9 — generally reckoned to be Britain's leading adventure software house, "but overcoming machine limitations has become a way of life for British programmers, and it's helped us to develop techniques that could be very important when we have machines with discs and larger memories."

Pete's brother, Michael, is hard at work — with yet another brother, Nick — developing an entirely new adventure system that looks like giving the competition a good run for its money. In fact, he's already reached the point where he's no longer that impressed with Infocom.

"At the low programming level their games really aren't that clever. Their compression routines are virtually non-existent and I'm not at all impressed by the speed — especially on the Commodore. Our market here may be about two years behind, but as soon as discs become available, we'll be ready to make a huge lean forward."

Host of advanced features

The system that's being developed by Level 9 boasts a whole host of advanced features. First, a new compression system that uses a combination of stored dictionaries and character encoding — based on the frequency of different characters — makes possible a vocabulary of between one and two thousand words. Previously, adventurers have had to struggle with game with anything from 200 down to as little as 20 or 30 words.

Objects that you can manipulate during the game will no longer just be things you can pick up or drop — you'll be able to look inside them, or use them as containers to carry other objects from place to place, and of course there'll be plenty of characters to meet on the way.

"I'm trying to work towards a soap-opera type of game," says Pete, who tends to be responsible for the design of Level 9's games, "and I'm aiming to develop characters with whom the player can get emotionally involved. As memories get larger, there's no point in just adding more puzzles — you don't want people slaving away for more than a few weeks to solve a game. You're better off using the space for entertainment, and characters are a good way of doing it."

Although future Level 9 products will tend to get more and more sophisticated, the company is ensuring that programs don't become too slow and cumbersome. On the new Spectrum system that it is working with at the moment, the player can carry on entering commands while the graphics draw simultaneously. And where graphics are concerned, Pete sees new machines — like the new Atari range — as providing tremendous potential for the use of landscaping techniques, somewhat

similar to those pioneered by Mike Singleton in the very successful Lords of Midnight series.

Level 9 is perhaps the best known British adventure house, but it's not the only one to be hard at work on developing more powerful systems. One small company, which to date has produced only one game — Castle Blackstar, distributed by CDS — looks set to become a household name over the next couple of years with an adventure system that will certainly rival that of Infocom and could force Level 9 to look to its laurels. SCR Adventures is the brainchild of Mark Sheppard and Mike Redman, two enterprising 24-year-olds who graduated in Computer Engineering from the City University in London and are now hard at work on an adventure development system of truly epic proportions.



"Text is best"

"It's been so frustrating, having good ideas but not having the memory or the discs to produce them on," complains Mark Sheppard. "The computers in this country just haven't been up to it, but as soon as this country goes to disc we'll be ready to jump in." SCR's system has been developed using the language C, running under Unix, and although it's still early days, it already outperforms the system used by Infocom in the notorious Zork trilogy. Highly efficient compression systems and a very complex parser to interpret the users inputs both work together in a framework that can cope with multiple interactive characters, container objects, and even moving vehicles for the player to drive from one location to another in!

Unlike Level 9 and like Infocom, SCR is aiming at the text-only market. "Most adventure graphics just use the same basic forms over and over again," says Mark, "and what's the point of seeing the same tree in every location, even if it is a different size and in a different place. With text, you can have a different tree in each place." Always provided, of course, that the text can live up to what's expected of it but, judging from Castle Blackstar, its first release, SCR is quite capable of wielding the pen effectively, although both Mark and Mike seem rather hesitant to talk about Blackstar: "It's very dated now, and I don't like to be reminded of it," says Mark, although others obviously disagree — the game was recently voted one of the top 10 best adventures.

Some surprises

There are some surprises, too, to be found where new adventure systems are concerned. One company that isn't usually associated with adventures and which is keeping things very hush-hush is Mastertronics. It is hard at work on a system that comprises two basic modules, a database input/management system and control module to access the data and provide higher level game-play routines. Interestingly, the system has been developed using the Forth language.

Stephen Kirk of Mastertronics has nothing but praise for Forth: "We can have a library of primitives that access records, provide input/output, parsing, and so on. It's an extendable language and gives us a five-times saving in time over using assembly language." What's more, it enables them to develop software and produce it simultaneously over a wide range of machines — essential in the British market where there are still substantial user-bases for what might normally be considered minority machines.

Adventure fans will doubtless be excited to learn that Mastertronic's new game is being designed by Sue Gazzard, who designed the very popular Lords of Time adventure for Level 9. It's also working, in conjunction with Roy Carnell, known to many adventurers as the man behind The Wrath of Magra, on an epic game that has been marketed by Mastertronics under the Mastervision label following the collapse of Carnell Software.

Mastertronics, however, is being careful not to leave cassette users behind in its search for bigger games. The company reckons that its system will be able to produce 250 location games plus graphics to run in Ram without discs, using only two separate loads from cassette — Wrath of Magra needed four separate loads.

Stephen Kirk reckons that their system will "just grow and grow. It'll give us a far greater diversity of input for our games, so we will be able to branch out into whole new areas, for example adapting ideas from books, films, and video, and accepting scripts from well-known writers" — like Douglas Adams, perhaps.

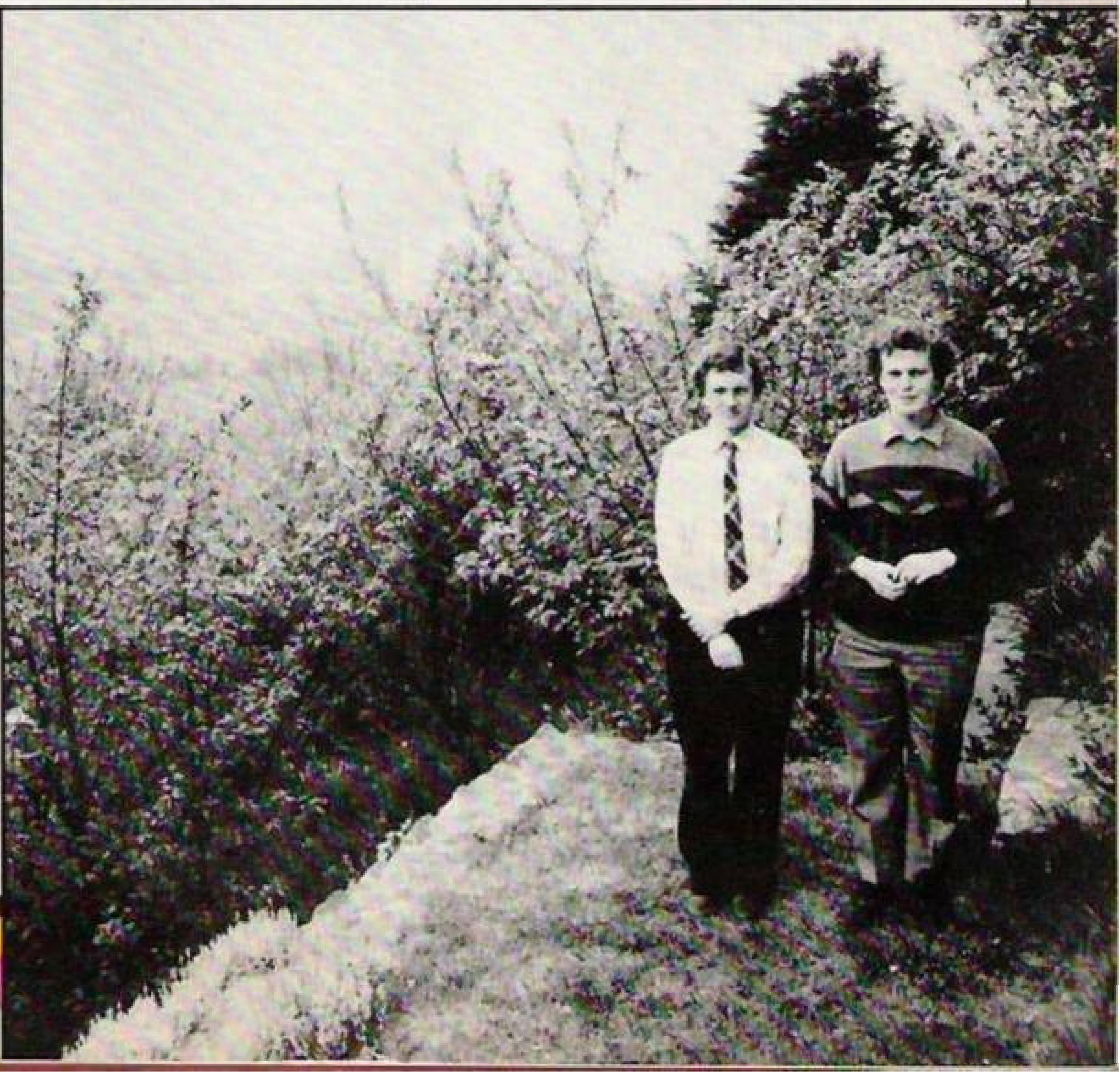
But the best news for the adventure player is yet to come. Although all the systems mentioned above will be used exclusively by the companies concerned to develop their own products — though perhaps from your ideas — there are also powerful programs to be released over the next year that will enable you to challenge Infocom at its own game!

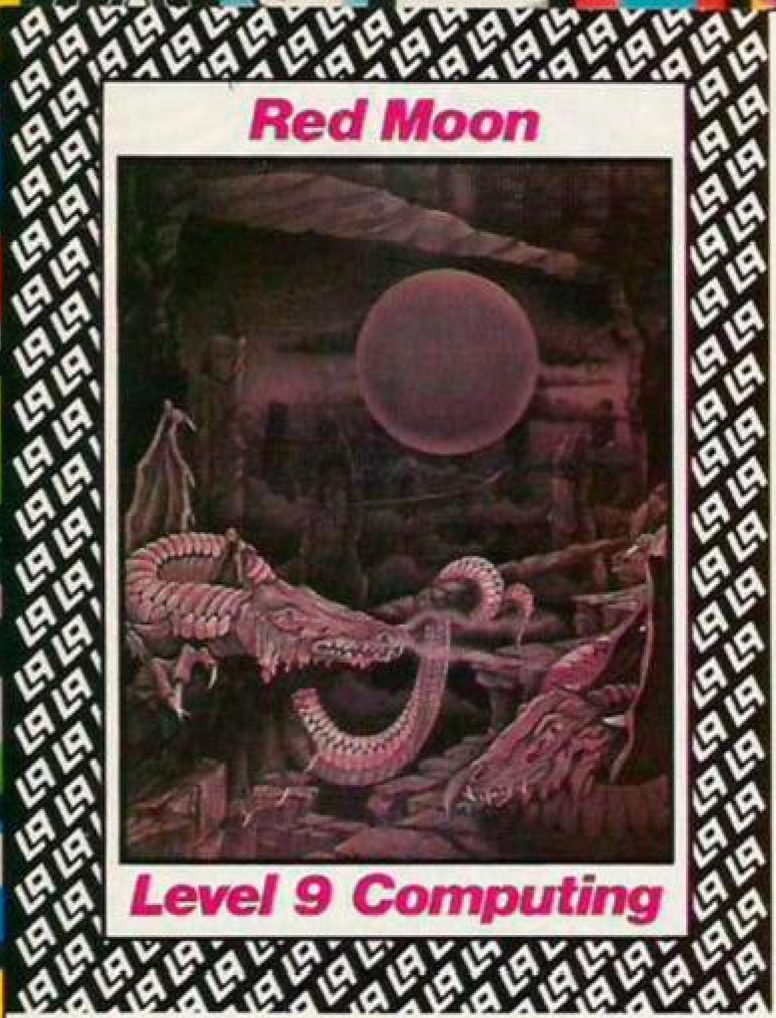
"It's more complex"

You may well be familiar with the popular *Exploring Adventures* series of books, published by Duckworth for a wide range of machines. The system in these books was concerned with simple two-word, verb-noun, Basic adventure programming, but now author Peter Gerrard is at work on an enhanced version which will, he hopes, be ready for release in September of this year.

"It's much more complex than the old system," says Peter, "and the majority of it is in machine code rather than Basic. The command parser is far more sophisticated and the location descriptions can be heavily compressed so you can fit more in." Peter also sees interactive characters as being very important to a good game: "If they work, they make it impossible to play the same game twice", he says, and he's currently working on

(continued on next page)







ADVENTURE

Red Moon is Level 9's new release but don't read too much into the title even if Level 9 does share High Wycombe with a USAF bunker.

(continued from previous page)

a game in conjunction with his brother Mike that has got him very excited: "The results have been better than either of us could have done on our own," and with any luck, using Peter's new system, adventurers all across the country will soon be able to join in the fun. "After all," says Peter, "it seems silly to develop a system and then keep it all to yourself." If only everyone else felt the same way.

Last, but not least, there's the famous, or infamous, Quill. Produced by Gilsoft, this adventure development system has already introduced thousands to the enjoyable art of adventure programming, and it now seems very likely that an enhanced version of the program could become available in the not-too-distant future. "We are interested in producing a more advanced Quill", says Tim Gilbert of Gilsoft. "So far I've definitely felt frustrated — people have relied far too much on cassettes but now, at last, disc systems are becoming more widespread, and with machines like the QL we can have networked games and multi-user adventures, though I have my doubts about the QL's speed capabilities for more than about three fully-interactive characters."

Developing the Quill and the Illustrator graphics program for different machines is taking up a lot of Tim Gilbert's time at the moment, and he's understandably cagey about his plans for the future but, like Peter Gerrard, when he does come up with the goods, you can be sure that he won't be keeping it to himself.



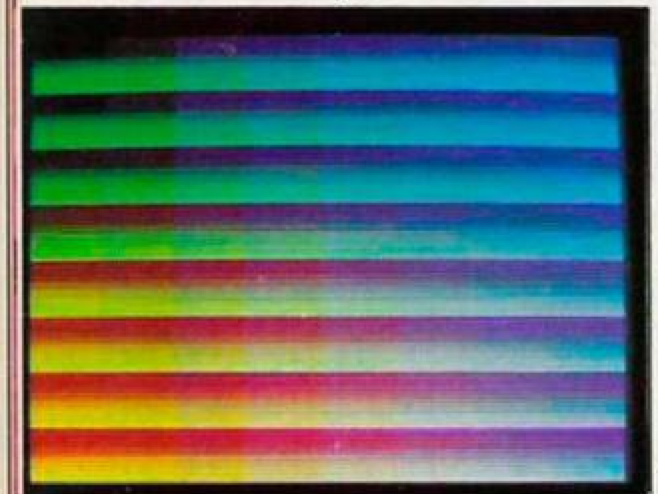
DR Logo will be built in on Rom.



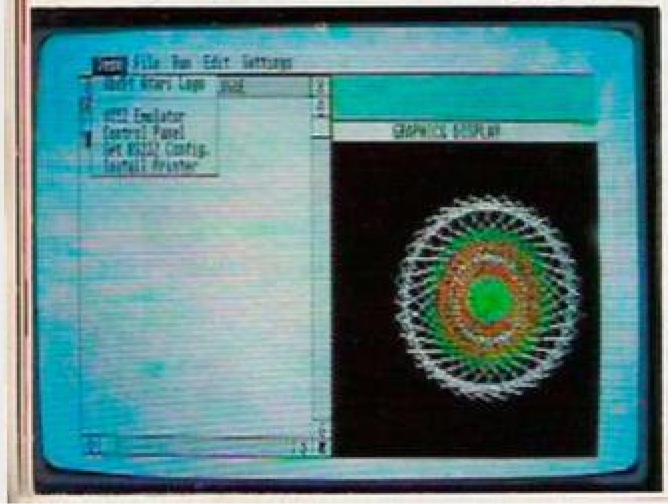
A cat for the mouse — hi-res graphics.



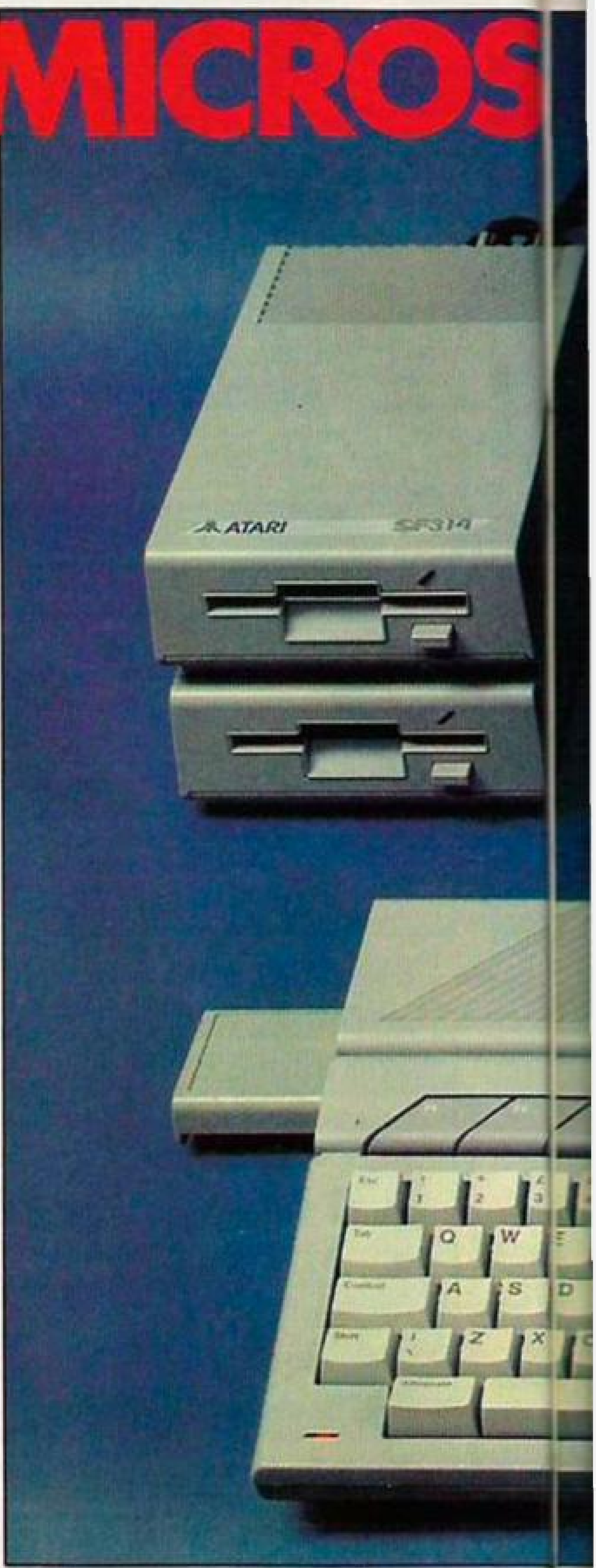
Gem — controlling the WIMP environment.



Op Art on the ST and below Logo graphics.



SUPERMICROS



FEW COMPUTERS HAVE generated as much interest as Atari's ST range, first announced in January. The 130ST, in particular, promised most of the features the average home computer owner would want to see in an ideal machine: 128K Ram, a powerful 16-bit processor, tremendous high-res graphics, an extensive array of ports, a high capacity disc drive, a Midi interface, and a mouse — at an unprecedentedly low price; not much more than the cost of a BBC. And to clinch the matter the ST computers run Gem, Digital Research's Graphics Environment Manager.

Gem is an operating system which gives the STs all the capabilities of Apple's Macintosh — icons, windows and pull-down menus under the control of a mouse. Unlike the Macintosh system, Gem has the advantage of being able to use colour and is already running on a number of other computers such as the IBM PC and the Apricot. Software written for other machines can be converted to the Atari fairly easily.

For the moment, however, the 130ST will not be sold in this country, and the machine we looked at, the 520ST, will cost somewhere between £750 and £800. This price may seem to be way outside the budget of most home users but it includes a 500K 3.5in. disc drive, a high-res monochrome monitor, 512K Ram, and a mouse. Along with the hardware there is an impressive list of software: TOS — the Tramiel disc Operating System, Gem, Gem Desktop, Gem Write, Gem Paint, DR Logo and DR Personal Basic.

With the exception of Tos these programs have been bought under license from Digital Research. But the problem of tailoring them to fit the ST seems to be taking longer than Atari anticipated. DR Basic, for example, which is being converted to give the user access to Gem's graphics, is not yet running. On the review unit the software was loaded in from disc. When the 520ST appears in the shops in September the software will be held in 192K Rom.

The computer and the peripherals have a common styling which looks businesslike, but tends to take up a lot of desk space. The keyboard unit is large — the price you have to pay for a nicely-spaced keyboard layout. The quality of construction of the computer and peripherals is good with no signs of patching.

Inside, the processor is a Motorola MC-68000 running at 8MHz and capable of addressing 16Mbytes of contiguous Ram. This is perhaps the best of the 16-bit devices, but do not make the mistake of thinking that 512K Ram is equivalent to 512K in an eight-bit processor environment. Code is stored as a minimum of two bytes — a word — and invariably a lot more memory space will be used. The overall effect will be to gobble up memory, and there is no means of externally extending the 512K Ram. For those readers used to eight-bit machine-code programming, a ratio of 75 percent seems about the effective memory for comparable programs.

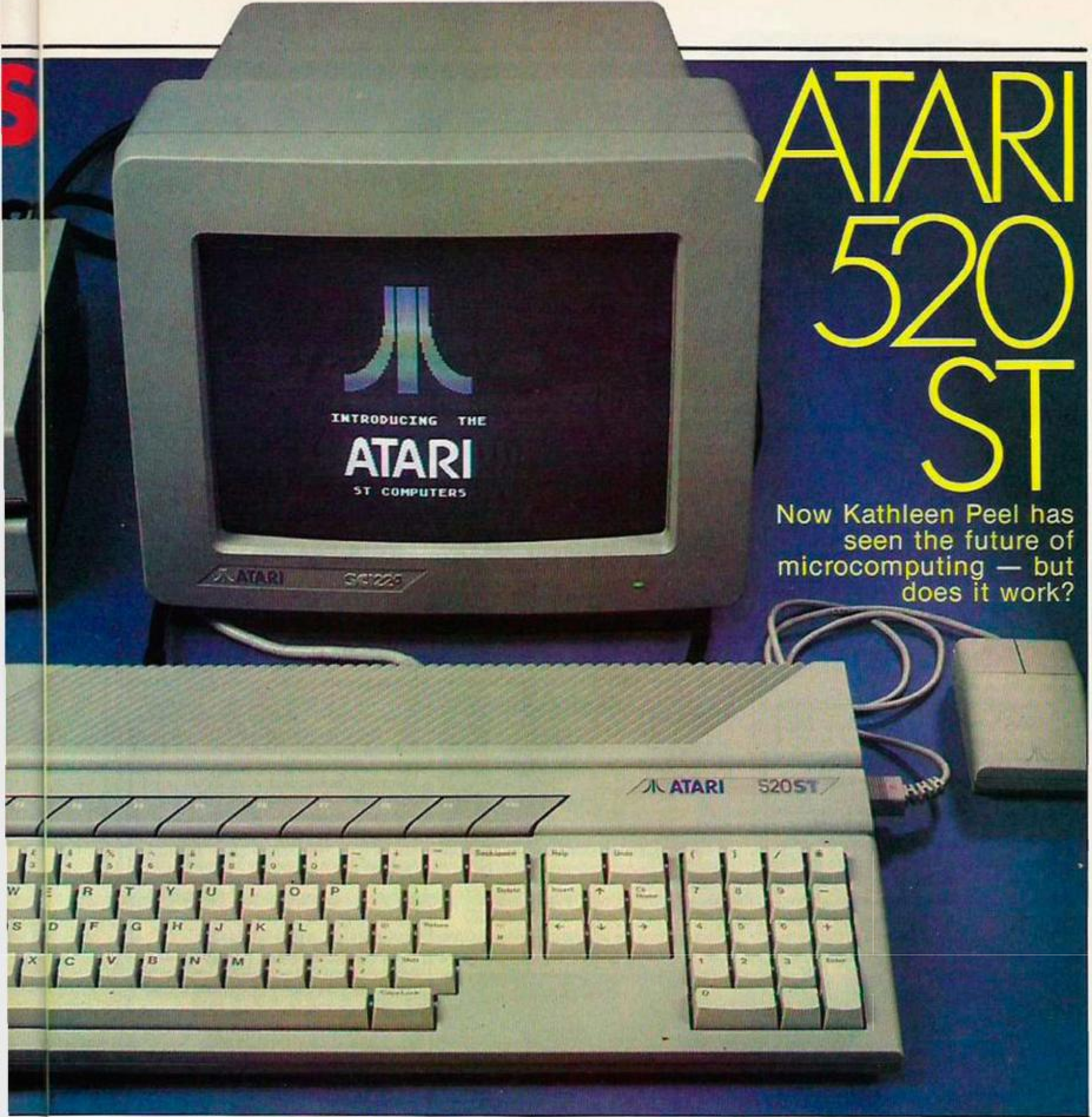
The Atari ST contains the following peripheral support chips: a 6301 which scans the keyboard, mouse and joystick ports, buffering the data in the keyboard queue; an MC-68901 which services communications and interrupts; a FD1772, floppy-disc controller supporting up to two drives; and the YA-2149, Yamaha's equivalent of the Texas AY-3812 sound chip. An MC-6580 provides the interface for the Midi functions and another MC-6580 provides the RS-232 interface.

In addition there are four special Atari ULAs which function as memory management, DMA, ancillary functions and graphics. There is no hardware character generator — it is all done in software. The memory chips consist of 16 256K Ram devices and six 32K Eproms.

The U.K. keyboard sports an extra key compared to the American computer. The left-

ATARI 520 ST

Now Kathleen Peel has seen the future of microcomputing — but does it work?



hand shift key has been split in two, to allow the £ sign to be shift 4 and hash to be repositioned. The keyboard consists of a 60-key typewriter-style portion, an eight-key cursor control, portion, an 18-key numeric keypad and 10 function keys. The keyboard feel is uniform, consistent and eminently suitable for word processing activities.

There is no internal speaker and the sound is reproduced from the attached display unit speaker. Nor is there a battery back up to the internal clock which must be set at switch on to provide accurate data/time stamps to files.

The external connections are numerous and will meet most requirements, the only notable omission being the inability to add on more memory externally.

The peripheral ports include two joystick ports on the right-hand side, one configured for a mouse. On the back are a reset button, on/off button and power supply socket, Midi in, Midi out five-way Din sockets, TV, monitor — composite and RGB — 25-way RS-232 socket, Centronics which also functions as an eight-bit bi-directional port, floppy disc controller, a 19-way D-shell direct memory access port that can be used for the attachment of a hard disc and a Rom expansion port on the side.

The Midi interface acts as a sequencer and can be used to perform step, time, note and trigger data entry. The Midi interface can also be used as a network link — as can the bi-directional Centronics port, the RS-232 and the hard disc port.

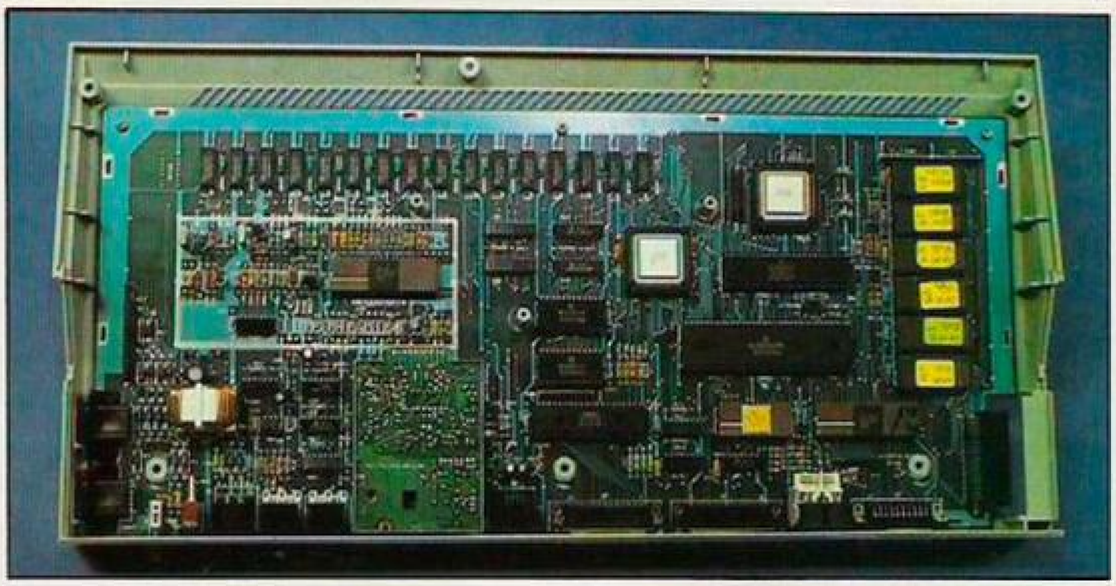
There are a number of high-level languages available — DR Logo, Forth, C, Assembler — but unfortunately the one I wanted to see was unavailable — DR personal Basic.

It seems strange to offer Logo at this level. Presumably Atari wants to attract educational users. My own view is that this and most other high-level languages are irrelevant to the real world: academics may favour the language but being an experienced Logo programmer will not earn you any credit with employers. Basic, by contrast, is a language that is likely to survive, and provides a useful general programming background; Cobol and Fortran are, likewise, still relevant for commercial and enginering applications; while C is the language

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(continued from previous page)
for the future — most software tools, including Gem and CP/M 68K, seem to have been written in it.

The other software supplied with the ST includes Gem, Digital Research's integrated operating system. Gem provides an initial interface between the operator and the machine through icons, pictorial representations of facilities or devices the operator wishes to use. Move the cursor over a symbol of a dustbin to indicate that the current document is rubbish and no longer required, press the mouse trigger and its gone! Well it saves typing New.



Mouse action smooth

The Mouse action appears smooth and is placed over the icon and the trigger pressed to select an activity.

Gem Desktop provides the working shell that allows loading, copying and general housekeeping. Gem Write is a word processor based on Volkswriter and Gem Paint, is a similar program to Macdraw.

There are three graphics modes, 320x200 in 16 colours, 640x200 in four colours, both from a pallette of 512 colours and 640x400 monochrome. Although the windows and their contents were capable of being moved virtually instantaneously using the menu data buffer, there were times when listing text seemed relatively slow. This is probably caused by making calls serviced through multiple layers of operating systems.

The sound generator has one noise channel and three tone channels. Easy Basic access through a macro language similar to MSX machines, one of the few parts of the MSX specification that I like, is not available.

50 titles being developed

The number of applications that currently run under Gem is very small, but there are well over 50 titles being developed by U.K. software houses alone. Atari intends to keep software prices under $100 for a single piece of software and hopes that $50 will be nearer the norm. A Telex emulator is being developed and should soon provide the ST with yet another use.

Documentation for software developers from Digital Research appears to be comprehensive and of high technical quality, hopefully forming a good platform on which to base the Atari manuals.

The Atari discs are 3.5in. Epson floppy drives. The SF354 gives 500K and the SF314, 1Mbyte unformatted storage. To load the TOS image file of 200K took approximately 35 seconds which is a very reasonable figure for low-cost drives.

Monitor display good

The monitor display quality was good, but was limited to 640x200 maximum by a protection circuit which is employed to prevent phosphor "burn-up" in low and medium resolution monitors caused by the higher frame rate used in high-resolution mode. One of the ST's unusual features is that it checks to see what sort of monitor is attached — RGB or composite video. It then selects the graphics mode appropriate to the monitor's resolution.

Gem provides an integrated operating system approach which is very successful in providing a simple entry to computing for the uninitiated. But at this level, it is the application packages that provide the user-friendly aspects of the program, the operating system shell ensuring a common approach. PC-DOS compatibility is really limited to data files only, it is unlikely that programs will actually run. ■

The Opposition

QL, the QL has 128K RAM, costs £400 and comes complete with adequate software. Adding a b/w monitor and enough memory to reach 512K and takes you up to £800. On that basis, it's not worth thinking about. The only reason for buying a QL is the £400 entry price if you already have a monitor or TV and the 48-hour software support that comes with the machine, a very important item not to be underestimated. All software is likely to run in the 128K, and some good packages are beginning to appear.

Apple's Macintosh, at about twice the price and limited to black and white, is the machine on the business side that the Atari ST is most likely to challenge.



Take your pick: .5Mbyte or 1Mbyte.



Spot the Midi — a DIN's eye-view.

IBM PC. The Atari ST has the ability to run in PC mode and use some PC data files. It is unlikely that PC DOS programs will run on the Atari.

Act Apricot F1E, at its current price of £600 for a 16-bit 8086 computer, with 128K RAM, CP/M 86, Basic and a 315K formatted 3.5in. Sony disc, does seem rather good value when you consider the wealth of software available. The Apricot F1 is available for about £1,000 and has the considerable advantage of also running MS-DOS, 256K Ram, a 1Mbyte unformatted disc and a substantial set of software packages. Not quite as good a hardware specification.

Commodore's Amiga is the cloud on the ST's horizon and on a technical level, the only other reasonable alternative besides the Apricot.

CONCLUSIONS

- The software problems will be fixed as the computer is systematically debugged and there is no inherent problem with the hardware. All comments relate to Rom details but what should not be underestimated is the time it will take to fully debug the amount of software provided. It is not a three-month exercise as the cause of every obscure fault must be diagnosed and the cure tested to ensure that it does not have any effect on associated code.
- The current market has been filled by products that were used either to:
  a) Teach someone about computing.
  b) An upgrade.
  c) For a specific applications games, or business packages.
  Further market penetration is becoming increasingly more difficult for new products as they vie for new market sectors. Obviously there is a huge market out there that I believe is extremely price-sensitive, and £800 is getting very close to the limit for a budget-priced serious micro.
- The 520ST is technically excellent. I understand why the 520ST was the first device to appear in the States where disposable income is higher, but in the U.K., the machine that I feel could have made Atari a fortune is the 130ST, provided it ever makes an appearance and at its launch price.
- The 520ST hardware is the new standard by which others will be judged. Do not worry too much about the software problems. They may take time to debug but when they have been, this will be a very good computer.



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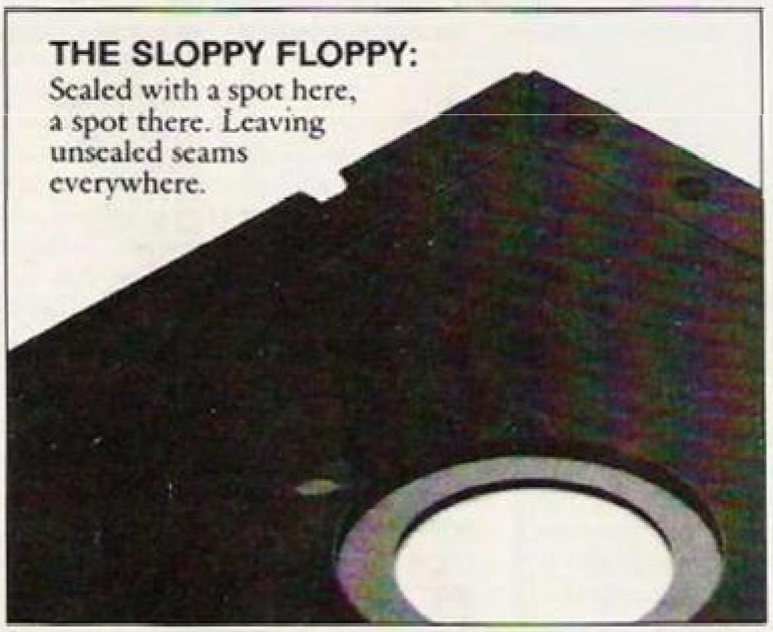
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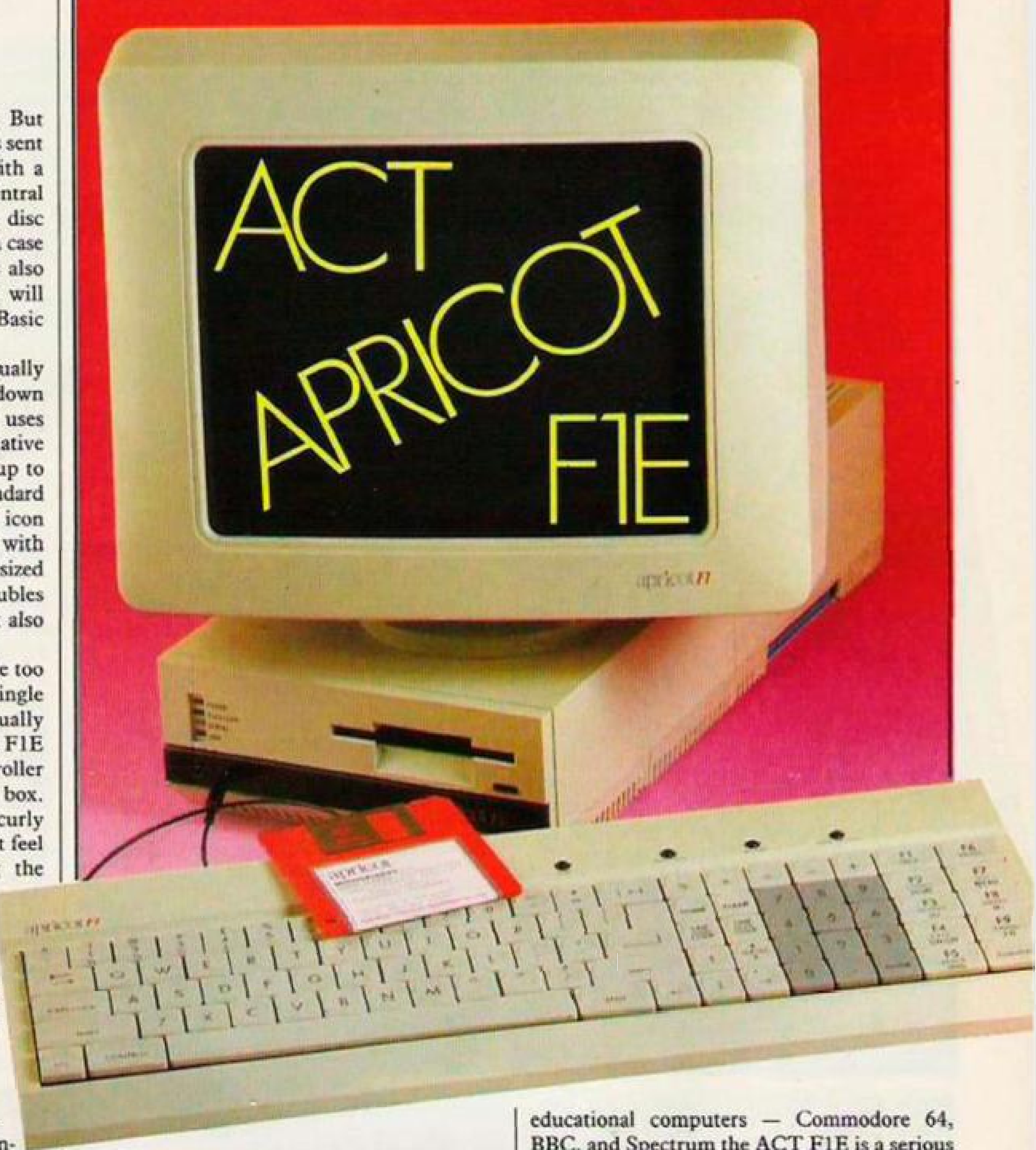
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SUPERMICROS

Elsie Dee takes a byte or two out of the new Apricot FIE and likes what she tastes.



ACT DOES NOT MAKE home computers. But the latest price cut on the Apricot F1E has sent it storming down into BBC territory with a specification of 128K Ram, 16-bit 8086 central processor and built in 320K Sony 3.5 in. disc drive for £685 including VAT. And just in case Acorn does not get the message ACT is also launching a £30 B-Tran program which will allow the F1E to run most BBC Basic programs.

Unlike the expanded home micros usually found in this price range the F1E is a cut down version of the F1 business micro which uses a mouse and icons as a user-friendly alternative to the keyboard. You can expand the E up to F1 spec including a mouse but even in standard form the E comes with a full colour icon display. The machine looks professional with its separate keyboard and slimline shoebox sized processor unit cum disc drive which doubles up as a base for the monitor, although it also has a video output to an ordinary TV.

The battery-powered keyboard is a little too like the QL's with the keys cut from a single slice of plastic rather than individually moulded. Batteries are needed because the F1E has a "look no strings" TV-remote-controller style infra red link to the main processor box. This has the advantage over the usual curly telephone cable connection that you don't feel like an elastic band is trying to tug the keyboard out of your hands, but the disadvantage is that unless you keep it lined up with the processor you can lose keystrokes. As an afterthought to try to overcome this ACT has added a light pipe which restores the physical connection between keyboard and shoebox — unfortunately the pipe is not as well made as the rest of the machine and ours broke in normal use.

The F1E comes with ACT's own icon-driven interface called Activity. Getting started couldn't be simpler — you just switch on and feed in the demonstration disc which introduces you to icons. These are a series of diagrammatic representations along the bottom of the screen labelled Activity, Files, Utilities, Disk, Help, and Exit. You just use the cursor keys to position an on-screen arrow over your choice and then use the Enter and Return keys to call it up.

This Apricot also comes with MS-Dos the IBM PC style operating system used in most business micros — although the F1E is not IBM compatible. Also supplied on disc with the F1E is GW-Basic, Diary and Sketch programs.

Unlike the second generation home and educational computers — Commodore 64, BBC, and Spectrum the ACT F1E is a serious 16-bit micro designed to upgrade into a full hard disc-based business system if necessary.

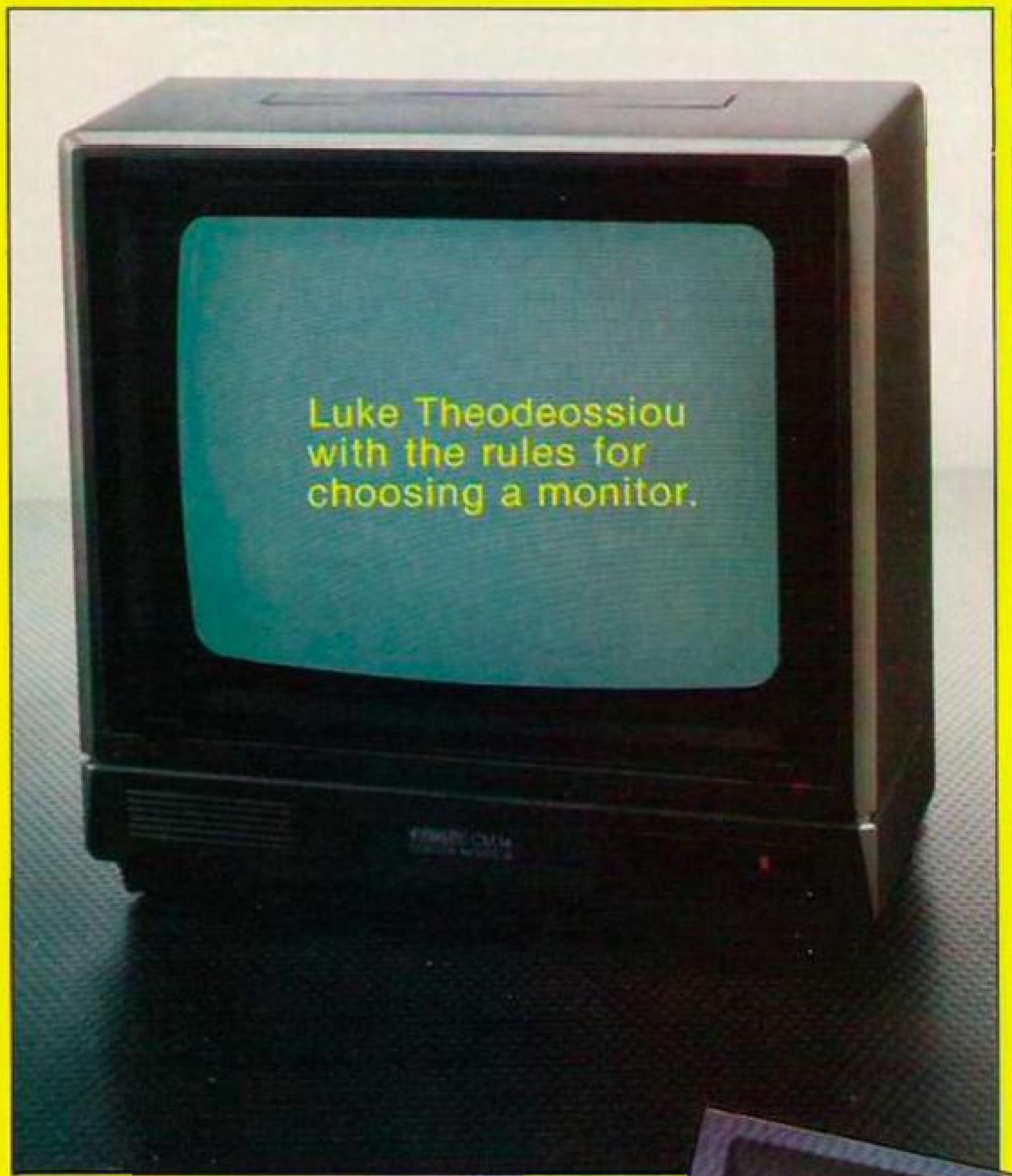
Unlike the QL the Apricot has a reliable built-in mass storage system and software already developed for serious use on its larger cousins in the ACT range.

Although the FIE can display four out of 16 colours in up to 640 by 256 resolution it does not pretend to be a games machine. Programs like Infocom's Hitchhikers guide to the Galaxy are available but the Apricot's strength is the range of business software which its operating system makes available to it which paradoxically may increase its chances in the educational market. Brian Androlia, managing director of ACT claims that students "need the experience of using serious industry standard software which normally will not run on 8 bit micros."

It may be next year before new generation micros like the Atari 520 ST and Commodore Amiga are on sale with the range of software the ACT already has, so for the moment the F1E wins the battle of the supermicros. ■



PICKING THE TV M



WHEN WE LOOKED at monitors — see *Your Computer* December 1984, page 84 — we made it clear that in our opinion dedicated standard resolution monitors did not provide good value for money. We therefore suggested that anyone in the market for a monitor should first of all determine the primary use the equipment is to be used for before even starting to look at what's available.

If you are currently using your domestic TV set as your VDU, then you are likely to be suffering from two main problems. The first is conflict of interests — you are interested in using your computer, whilst the rest of the family is interested in watching TV. The result — conflict! One possible solution to this is to buy a second-hand colour TV. Current prices range from around £75 to over £200. The other possibility on similar lines is to buy a new 12in. monochrome portable TV for about £55.

Neither is particularly satisfactory. A black and white TV is really quite useless for games and is just as bad — from a display quality point of view — even if all you ever do is text processing. The best advice here is — forget it. A second-hand colour set is perhaps more tempting but watch out. It's likely to be several years old and its display quality is not going to be as good as that achieved by modern sets, even if you found one which was in absolutely perfect condition.

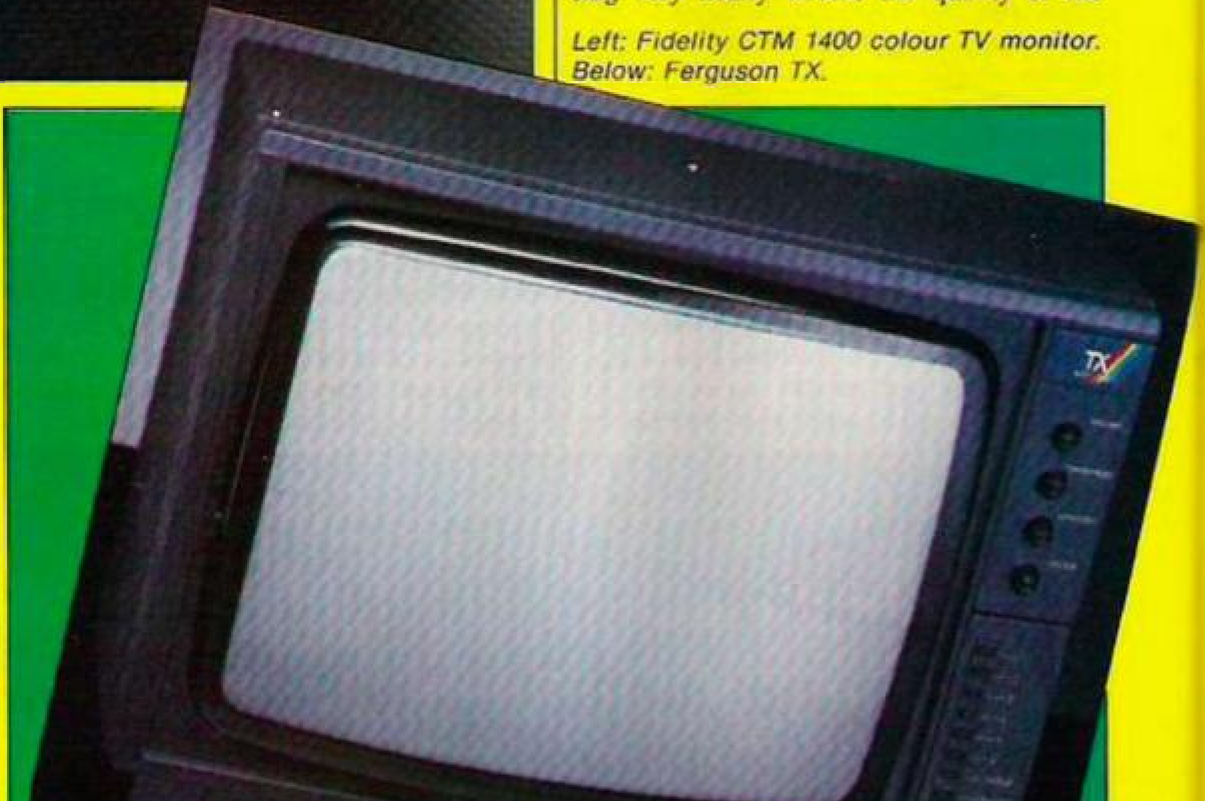
Another mine field is making the right choice, not just what make but also which model and most important of all judging its condition. Unless you are a TV engineer you could end up wasting quite a bit of money on junk. Even if you found a good one, it's very much more likely to go wrong and repairs are expensive. All in all, the risks are just too high.

The other problem which is common to all TV sets, old and new alike, is the display quality when used in conjunction with a computer. Colours lack contrast, they are noisy, there are crawling interference patterns on the screen, etc. All this makes any serious work such as text processing or program compiling virtually impossible with eye fatigue into the bargain.

The reason for this is that the computer generates three distinct signals — Red, Green and Blue — at TTL level. These signals are the cleanest possible and are used to drive RGB monitors. In order to enable owners to use their domestic TV sets, two further stages of processing are necessary. The first is to combine the three signals, together with the synchronising signal — Sync — to produce a composite video signal. This is done for a particular broadcasting system standard — for example, most of Europe, including the UK, uses a colour encoding system known as PAL.

This signal is then passed to a modulator which converts it to a radio frequency — RF — signal which is just like the signal picked up by your TV aerial. All this additional processing very nearly wrecks the quality of the

Left: Fidelity CTM 1400 colour TV monitor. Below: Ferguson TX.



MONITOR FOR YOU

A few basic rules will help clarify any grey areas.

1. Remember, all current TV-monitors are standard resolution only. If you require higher resolution, then a dedicated medium or high resolution monitor is the only answer.
2. If you connect your computer via the aerial socket, the results will be identical to an ordinary TV. Monitor performance is only possible when using "direct" connections via the SCART socket.
3. Beware of monitor-look TVs which are not necessarily TV-monitors. This is easily checked but do make sure.
4. Before buying, check that your computer has RGB outputs, or at least a composite video output. If you have both always choose the RGB output for best results.
5. Sound can also be connected directly via the SCART socket but it's hardly worth it except for music programs or similar.
6. Although TV-monitors come in a variety of sizes, the larger sizes are best suited for use with video recorders. The optimum size for home computer applications is 14in.
7. FST (Flat Square Tube) equipped TV-monitors are becoming available but the choice is limited and prices higher. FST does have some advantages over conventional tubes as well as being more pleasing on the eye but in our opinion it's not good value for money yet.
8. Think about your future display requirements before choosing your VDU. As always the best advice is to insist on a demonstration before buying.

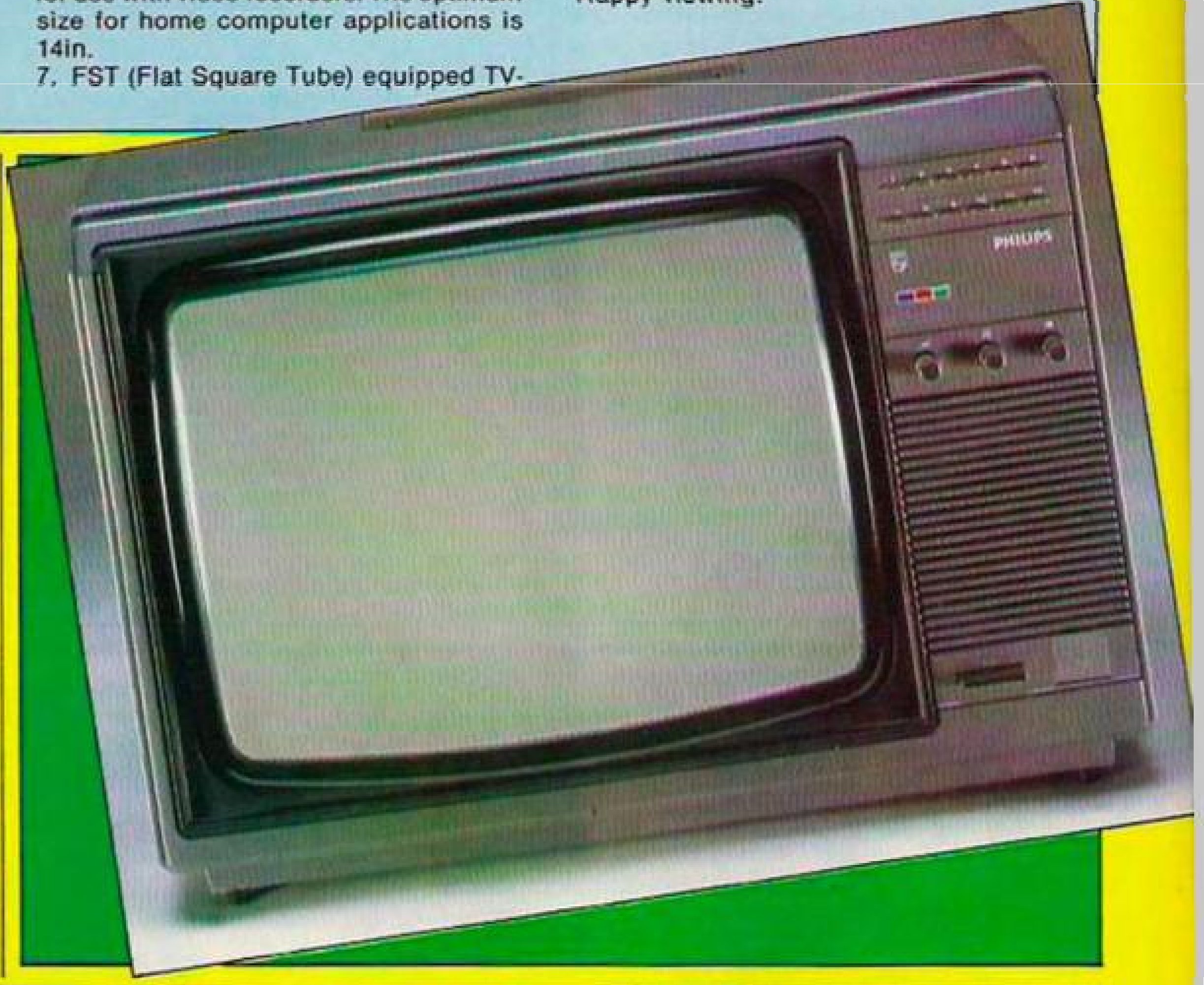
Happy viewing!

original RGB signals. The job is finished off by your TV set which has to convert the aerial signal back to separate RGB signals!

The sensible approach of course is to bypass all this encoding and decoding. This is where the TV-monitor comes in. Essentially, all it is is an ordinary TV set equipped with additional input sockets to enable direct connection from the computer to the appropriate point inside the set. Of course it's a little more complicated than that.

Amplifiers and impedance converters are used to ensure correct conditions for the signals; the TV signal has to be switched off; and the chassis has to have complete mains isolation. Although converting an existing TV for RGB operation is a theoretical possibility, the hustle, the expense and the safety risks involved make this proposition a definite non-starter.

For little more than the cost of a standard model, you get first class RGB monitor performance for your computer; a much better picture from your video recorder — by using the composite video input — and of course a TV set as well! ■



Right: Philips CT 2007 receiver monitor.

The buyers guide below is a fairly comprehensive chart of small screen TV-monitors currently available from high street retail shops. Most manufacturers also offer large screen sizes but these have been omitted from our chart. Some computer retailers have in the past offered other makes, mainly far eastern imports, but the trend now is to stay with well known brands. Shopping around may secure some savings but at best these will be very modest. Our rating system — from 1 to 10 — is a personal assessment and takes into account price, availability, ease of use, general performance, etc. It is intended as a guide only and we strongly suggest that you view before you buy.

Brand name	Model	Size	FST	R/C	Price	Connecting leads	Remarks	Rating
Ferguson	TX MC01	14in.	—	—	£229	Included	Auto source switching Recommended	8
Fidelity	CTM1400	14in.	—	—	£219	—	Good value	7
Finlux	1014RGB	14in.	—	—	£275	Optional	Pricey	4
Grundig	P40-125	36cm	Yes	—	£269.95	—	Good but pricey	5
Grundig	P40-145	36cm	Yes	Yes	£299.95	—	Good but expensive	4
Mitsubishi	CT1501BM	36cm	Yes	Yes	£299	—	Good but expensive	4
Philips	1120	9in.	Yes	—	£300	Optional	Good but expensive	3
Philips	2007	14in.	—	—	£239	Optional	DIN socket	6
Tatung	TN1441	14in.	—	—	£199	—	Very good value; recommended	8

Key: FST = Flat Square Tube
R/C = Remote control

ATARI SYSTEM *Competition* RESULTS

APRIL'S COMPETITION to win a complete Atari system attracted one of the largest entries in living memory. Probably the prize was the main draw but contestants also appeared to relish the challenge we set — to write an Atari-related limerick.

Unfortunately many entries took a broad view of what a limerick is. Thus we had odes to Atari, sonnets, rhyming couplets, 100 line verse epics, blank verse, ditties and numerous other verse forms. But, good though they were, we had to disqualify them: if it doesn't have five lines it is not a limerick.

It was also probably a mistake to end one of your lines with the word Atari. As there are only a limited number of rhymes with Atari most entries of this type tended to sound the same. They usually involved young men on safari, driving Ferraris, and sipping Camparis. One of the best of these was V. Skinner's:

A compulsive eater called Marie
Likes to nibble while drinking Campari
Between liquid sips
She's mad about chips
And gets far better bytes from Atari.

In the same line B. Axelford almost clinched it but stretched the rhymes too far:

Charles and Diana's son Harry
Was given a brand new Atari
But Prince William was mad
Cos just a Spectrum he had
So he threw the Atari At-ari.

Perhaps M. Eaton had the right idea with his succinct:

Atari Atari Atari
Atari Atari Atari
Atari Atari
Atari Atari
Atari Atari Atari

J. Outram likewise came up with something different:

A computer fanatic from Rhodes
Wrote a program for making up odes
The Atari possessed him
But his Spectrum outguessed him
By producing last lines much longer than any of the others and with no apparent rhyme.

Among the other contenders were a number of highly competent entries from abroad. In fact E. Teler's from Jerusalem was one of the few which caught the true spirit of Edward Lear:

A man known to me and to you
Runs Atari (ran Commodore too)
He thinks it is nice
To fight elephants with mice
I think he should open a zoo.

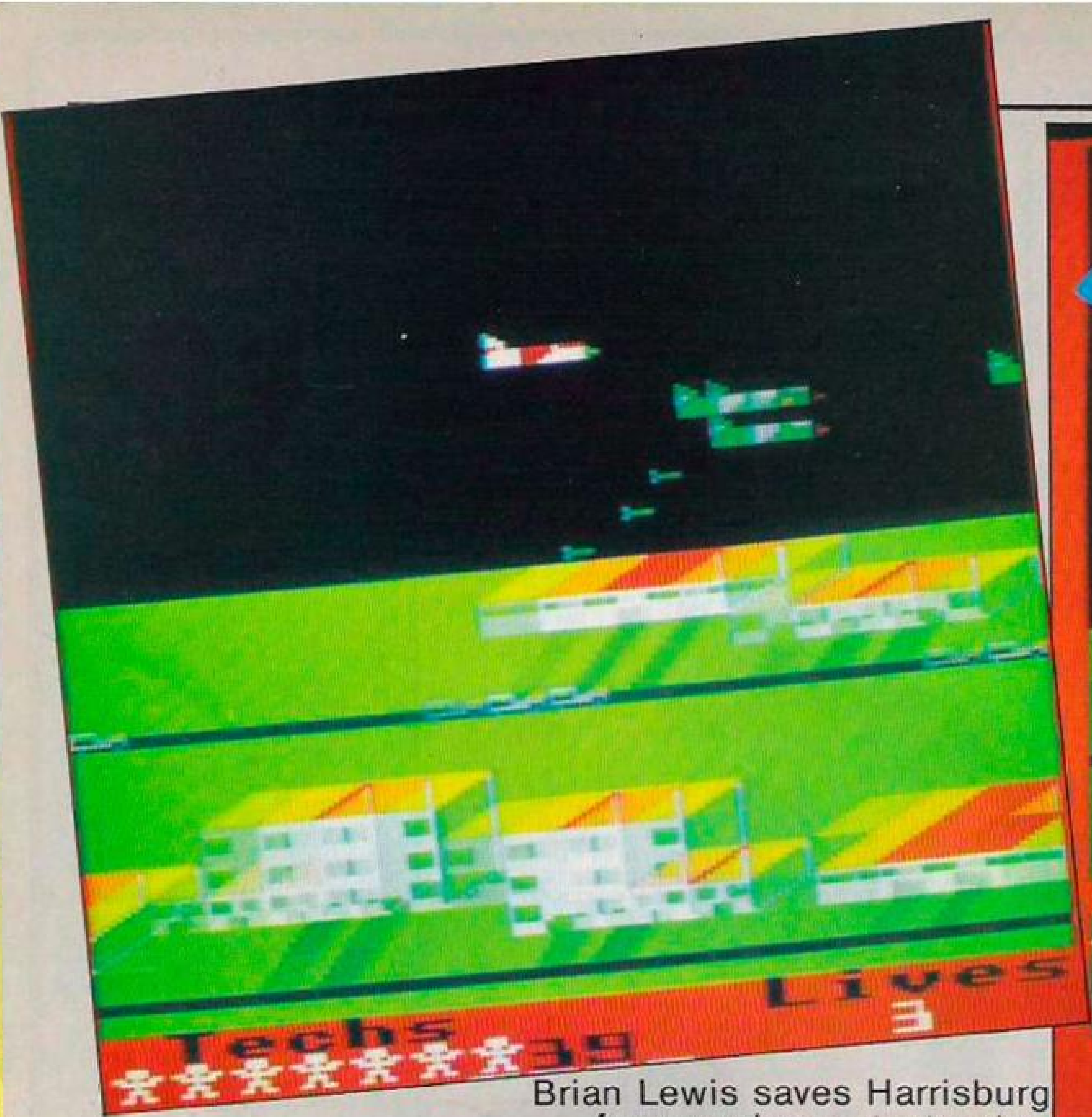
D. Williams' limerick also struck the right nonsensical note although it goes astray in the last line:

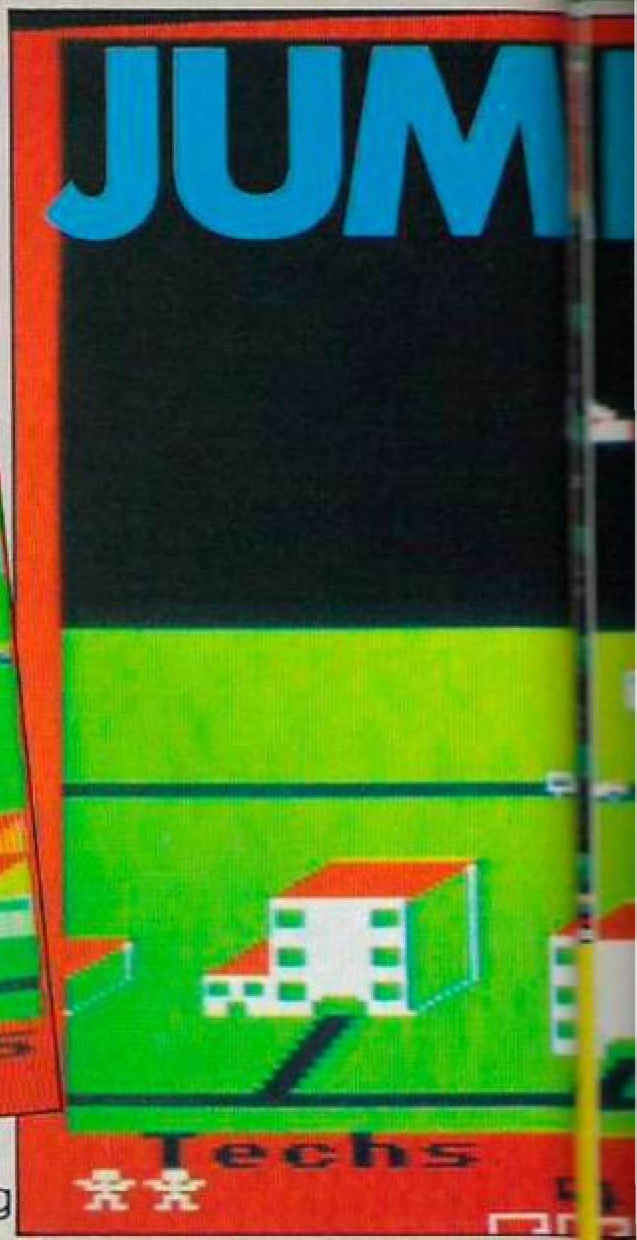
Listen to Jumping Jack Tramm
He's cutting the prices like ham
His methods are sound
XLs for the pound
You get more for your Pacs from this man.

All these were in the running but after much deliberation we awarded the prize to Marie McNally, 8 Raglan Gardens, Caversham, Reading, Berkshire, for:

Mixing up Singapore and Djakarta
Jack Tramiel would call corrupt data
But it's nothing so sinister
Just the lady Prime Minister
We should swap for an Atari — it's smarter.

The mix up referred to was made by Mrs. T. on her recent visit to the Far East.



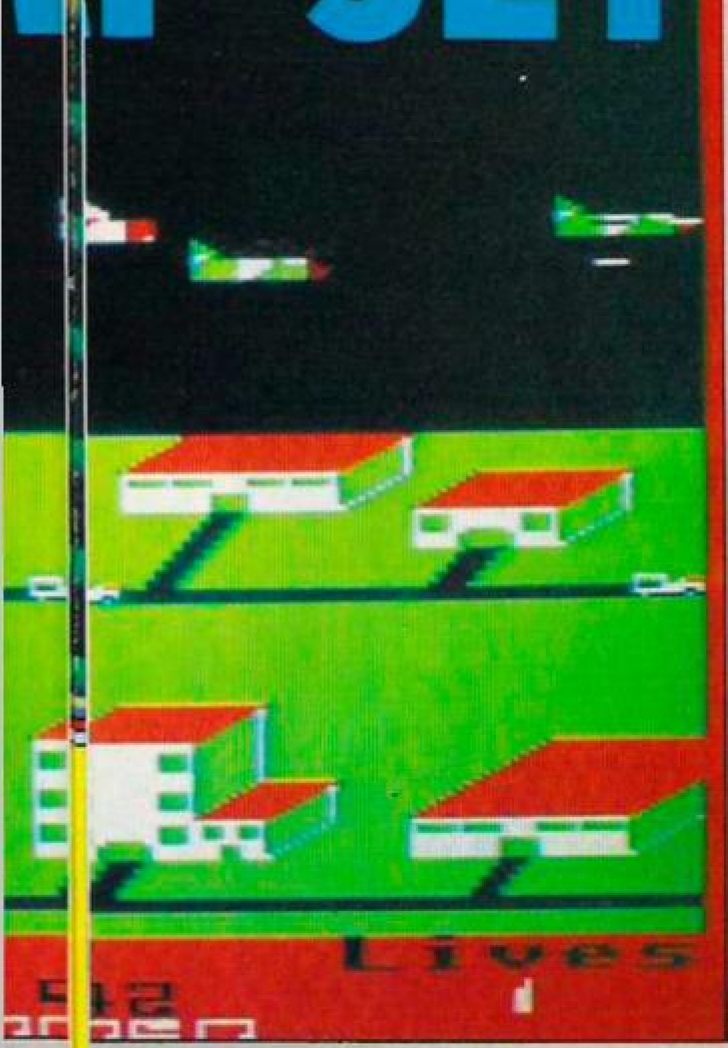


Brian Lewis saves Harrisburg from nuclear catastrophe.

Listing 1.

```
   0VDU23,150,28,28,107,62,8,28,20,54,23,151,36,90,16
9,149,211,179,74,52
   10DATA248,252,254,62,127,255,255,255,240,240,240,24
0,143,143,143,159,240,240,240,240,79,127,255,255,240,2
40,240,240,120,184,152,184
   20DATA240,240,240,240,240,241,242,242,241,241,241,2
42,186,115,179,241,240,240,240,248,186,217,184,240,240
,240,240,240,240,240,248,248
   30DATA240,240,240,240,225,209,145,209,240,240,240,2
40,47,239,255,255,240,240,240,240,31,31,31,159,241,243
,247,199,239,255,255,255
   40DATA&11,0,1,0,255,0,5,0
   50DATA112,48,16,220,136,0,0,0,240,240,240,240,119,1
19,119,102,240,240,240,240,187,136,0,0,240,240,240,240
,248,52,22,52
   60DATA90,37,16,156,138,8,2,10,225,210,45,240,55,39,
127,70,90,165,240,180,155,8,2,10,225,210,45,240,188,37
,30,22
   61DATA&10,0,4,0,255,0,50,0,0,0,1,0,2,0,1,0,1,0,4,0,
1,0,1,0
   62DATA240,150,195,240,240,240,195,150,240,240,240,0
,0,0,240,240,240,248,244,0,0,0,244,248,240,240,240,112
,48,112,240,240
   80DIM G% 4000:TEMP=G%:J%=TEMP+16:FORT=0TO223:READD:
T?J%=D:NEXT:for=J%+32:lef=for+32:sou=J%+96:EP=sou+8:XP
=EP+32:rad=XP+32:Wh=rad+8:Su1=Wh+8:mis=Su1+8:H%=mis+32
:FORT=0TO2STEP2:P%=H%:[OPTT
   90.setup LDA#&20:STA&70:LDA#&6C:STA&71:LDA#&10:STA&
72:LDA#&6C:STA&73:LDA#&10:STA&74:LDA#&6D:STA&75:RTS
  100.right JSRsetup
  110LDX#0:.a LDY#0:.A LDA(&70),Y:STATEMP,Y:INY:CPY#16
:BNEA
  120LDY#16:.b LDA(&70),Y:STA(&72),Y:INY:CPY#0:BNEb:
  130LDY#0:.c LDATEMP,Y:STA(&74),Y:INY:CPY#16:BNEc
  140CLC:LDA&70:ADC#&40:STA&70:LDA&71:ADC#1:STA&71
  150CLC:LDA&72:ADC#&40:STA&72:LDA&73:ADC#1:STA&73
  160CLC:LDA&74:ADC#&40:STA&74:LDA&75:ADC#1:STA&75
  170INX:CPX#12:BNEa
  180RTS
  190.left JSRsetup
  200LDX#0:.a1 LDY#0:.A1 LDA(&74),Y:STATEMP,Y:INY:CPY#
16:BNEA1
   210LDY#&FF:.b1 LDA(&72),Y:STA(&70),Y:DEY:CPY#15:BNEb
1
   220LDY#0:.c1 LDATEMP,Y:STA(&70),Y:INY:CPY#16:BNEc1
   230CLC:LDA&70:ADC#&40:STA&70:LDA&71:ADC#1:STA&71
   240CLC:LDA&72:ADC#&40:STA&72:LDA&73:ADC#1:STA&73
   250CLC:LDA&74:ADC#&40:STA&74:LDA&75:ADC#1:STA&75
   260INX:CPX#12:BNEa1
   270RTS
   280.scroll LDA#&FF:STA&970:CPX#1:BEQii:JMPleft:.ii J
MPright
   290.I% JSRreset:LDA#&58:STA&60:LDA#&6B:STA&61:LDY#0:
.A LDA#0:STA&95A,Y:INY:CPY#6:BNEA:STA&96F:STA&992:STA&
994:LDA#15:STA&94F:LDA#for MOD256:STA&62:LDA#for DIV 2
56:STA&63:LDA#63:STA&80:LDA#95:STA&81:JSRamo
   291SEC:LDA&C2:SBC#5:STA&C2:JSRscore:LDA#0:STA&76:LDA
#5:STA&77:LDA#0:STA&78:STA&79:STA&7A
   300.start JSRprint
   310LDX#0:JSRbomb:CPX#&FF:BNEpp6:JSRtech:CPX#&FF:BNEp
p6:JMPatom:.pp6 JSRenemy:LDA&993:CMP#3:BMIkis:JSRMISIL
:.kis LDY#0
   320.Aa1 LDA(&60),Y:EOR(&62),Y:BNEbB1:CMP#240:BEQbB1:
CMP(&62),Y:BEQbB1:INY:CPY#32:BNEAa1:JMPcC1:.bB1 STX&9F
:JMPdead:.cC1
   330LDX#1:.k LDA&95A,X:AND#1:CMP#0:BEQjJS:TXA:PHA:JSR
move:PLA:TAX:.jJS INX:CPX#6:BNEk
   340LDA&970:CMP#&FF:BEQOO1:JSRdelay:.OO1 LDA#0:STA&97
0
   350LDA&94F:CMP#1:BEQhJ:LDA#&81:LDX#&BE:LDY#&FF:JSR&F
FF4:CPY#&FF:BNEhJ:JSRrub:DEC&94F:SEC:LDA&60:SBC#&40:ST
A&60:LDA&61:SBC#1:STA&61:.hJ
   360LDA&94F:CMP#15:BEQHj:LDA#&81:LDX#&9E:LDY#&FF:JSR&
FFF4:CPY#&FF:BNEHj:JSRrub:INC&94F:CLC:LDA&60:ADC#&40:S
TA&60:LDA&61:ADC#1:STA&61:.Hj
   370LDA#&81:LDX#&9A:LDY#&FF:JSR&FFF4:CPY#&FF:BNEuI:JS
Rfire:.uI
   380LDA&81:CMP#255:BEQtS
   390LDA#&81:LDX#&98:LDY#&FF:JSR&FFF4:CPY#&FF:BNEtS:JS
RRIGHT:.tS
   400LDA#&81:LDX#&99:LDY#&FF:JSR&FFF4:CPY#&FF:BNETs:JS
RLEFT:.Ts
   410LDA&96F:BEQki:CLC:LDA&60:ADC#&40:STA&4D:LDA&61:AD
C#1:STA&4E:LDY#0:LDA(&4D),Y:CMP#240:BEQki:JMPdead:.ki
   420LDA&96F:CMP#4:BNEaa6:JSRllef:.aa6 LDA&96F:CMP#2:B
```

P JET ASSAULT



THIS IS A scrolling game written for the Acorn Electron and BBC in which you have to defend Three Mile Island from the onslaught of enemy aircraft. To defend against the invaders you are armed with a Harrier Jump Jet which has the air-to-air missile capacity of 50. Once you have fired all your missiles, or if at any time you want to reload, you simply land your Harrier on a building similar to the one you started from.

Your actual fighting area is eight times larger than the screen. However enemy planes have a wrap-round capacity which allows them to keep flying while you have run out of air space. You lose a life if you crash into the horizon, crash into an enemy plane or get hit by one of their bombs. However, as you are defending Three Mile Island there is a greater danger than losing your three lives, the danger of a nuclear explosion. On the main screen display you will see the word "Techs" and beneath it a number of small figures, if the enemy planes drop a bomb on your fuel dump building you lose a technician; lose all your techs and the resulting nuclear blast destroys everything including your remaining three lives.

To further the difficulty of the task set for you the enemy has invented a new heat seeking missile which unlike their attack planes can travel faster than you. This missile only appears after you have killed three enemy planes without losing a life.

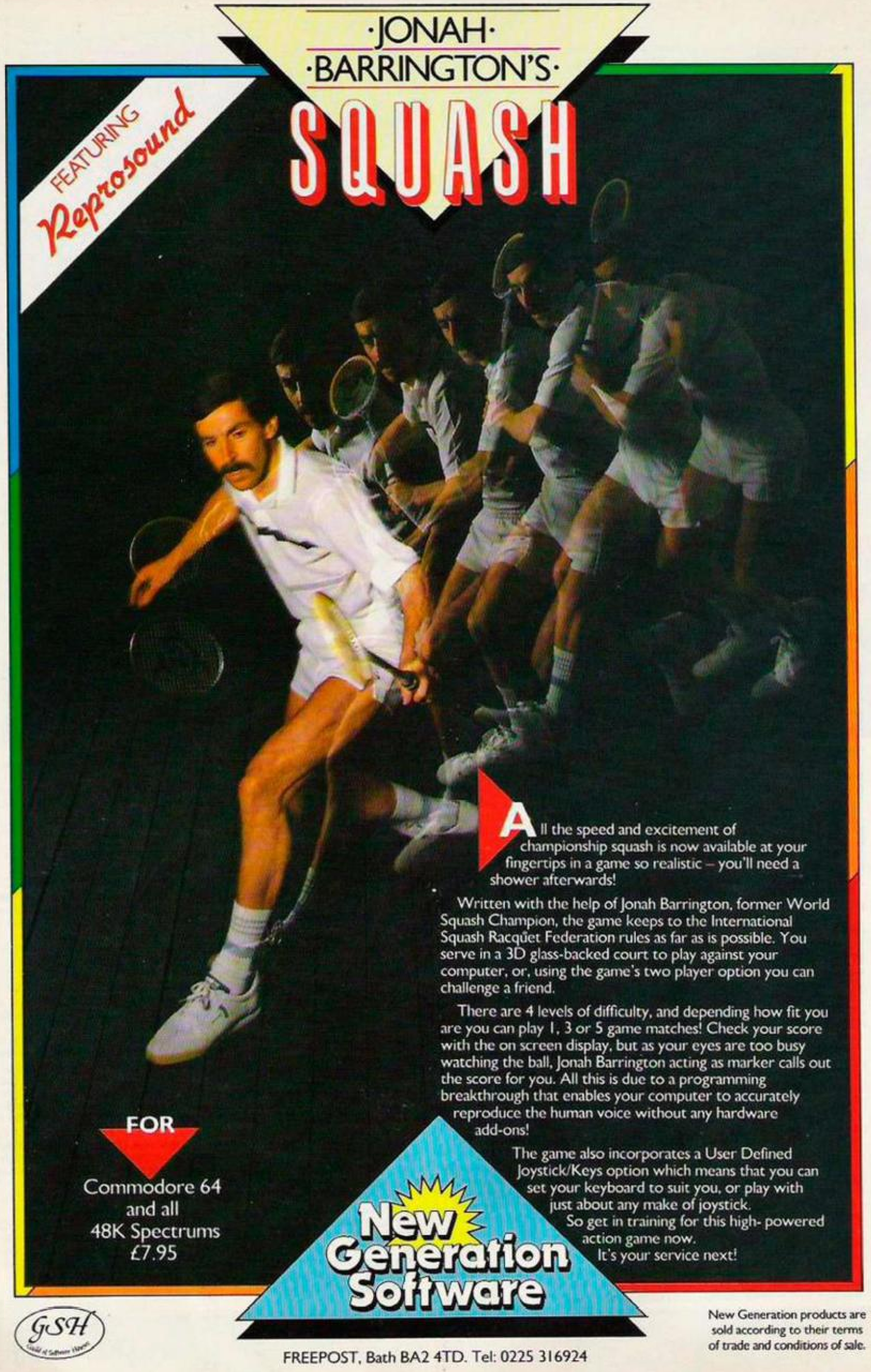
This is one of the few scrolling games written for the Electron — the lack of scrolling games is mainly due to the large size of the screen memory. BBC users can get over this problem by using the 6845 chip — not present in the Electron — to control full screen scrolling via registers 12 and 13. To counter this problem I have used a screen window of exactly 32 bytes wide, which enables fast and easy handling of the screen display since when displaying the contents of the window the computer does not have an X position number larger than 255 thus enabling a simply loop involving only one of the computers registers.

Pleasing screen displays

There are two listings to type in, check, save and then run. The first program is the main machine-code program containing most of the graphics, sound definitions and all the machine-code routines while the second handles setting up the screen display, keeping the score, storing the high score table etc., although quite long, the program is well worth typing in as the finished product gives some pleasing screen displays and presents a very playable game. If BBC users wish to play Jump Jet Assault then they merely have to increase the contents of the x and y registers in line 460 of program 1 to a suitable value found through experiment.

```
NEbb6:JSRrrig:.bb6
  430LDA&96F:BNEop:LDA&94F:CMP#15:BNEop:CLC:LDA&60:ADC
#&40:STA&4D:LDA&61:ADC#1:STA&4E:LDY#7:LDA(&4D),Y:CMP#1
5:BEQop:JMPdead:.op
  440JSRSEE:LDX#0:LDY#0:.Aa5 LDA&9A4,Y:BNEBb5:INX:.Bb5
 INY:INY:INY:INY:INY:CPY&99C:BNEAa5:CPX&993:BNECc5:JSR
reset:INC&993:CLC:LDA&99C:ADC#5:STA&99C:CMP#25:BNECc5:
LDA#20:STA&99C:LDA#5:STA&993:.Cc5
  441LDA&94F:CMP#15:BNEyU7:LDA&B1:CMP#00:BEQyU7:SED:CL
C:LDA&B1:ADC#1:STA&B1:CLD:JSRamo:JSRRISE:.yU7
  450JMPstart
  460.delay LDX#100:.a LDY#100:.b DEY:BNEb:DEX:BNEa:RT
S
  470.rub LDY#0:.c LDA#240:STA(&60),Y:INY:CPY#32:BNEc:
RTS
  480.fire LDA&96F:BEQend:LDA&B1:BEQend:LDX#1:.yyS LDA
&95A,X:CMP#0:BEQjS:INX:CPX#6:BNEyyS:RTS:.jS JSRSOU:SED
:SEC:LDA&B1:SBC#1:STA&B1:CLD:JSRamo
  490LDA&95A,X:ORA#1:ORA&96F:STA&95A,X:LDA#0:STA&960,X
  500LDA&96F:CMP#4:BEQLLEF:CLC:LDA&60:ADC#32:STA&950,X
:STA&4D:LDA&61:ADC#0:STA&955,X:STA&4E:JMPbulPRI:.LLEF
SEC:LDA&60:SBC#8:STA&950,X:STA&4D:LDA&61:SBC#0:STA&955
,X:STA&4E:JMPbulPRI:.end RTS
  510.move LDA&950,X:STA&4D:LDA&955,X:STA&4E:JSRBULrub
:INC&960,X:LDA&960,X:CMP#7:BPLeND
  520LDA&95A,X:AND#2:CMP#2:BEQRRIG:SEC:LDA&950,X:SBC#1
6:STA&950,X:STA&4D:LDA&955,X:SBC#0:STA&955,X:STA&4E:JM
PbulPRI:.eND LDA#0:STA&95A,X:RTS
  530.RRIG CLC:LDA&950,X:ADC#16:STA&950,X:STA&4D:LDA&9
55,X:ADC#0:STA&955,X:STA&4E:JMPbulPRI
  540.bulPRI LDA#255:.kI LDY#5:STA(&4D),Y:RTS
  550.BULrub LDA#240:JMPkI
  560.print LDY#0:.B LDA(&62),Y:STA(&60),Y:INY:CPY#32:
BNEB:RTS
  570.LEFT LDA&62:CMP#J% MOD256:BEQone:LDA&62:CMP#for
MOD256:BEQtwo:RTS
  580JMPscroll
  590.one INC&994:LDA&994:CMP#1:BNEcc6:LDA#0:STA&96F:S
TA&994:LDA#for MOD256:STA&62:LDA#for DIV256:STA&63:.cc
6 RTS
  600.two LDA#lef MOD256:STA&62:LDA#lef DIV256:STA&63:
LDA#4:STA&96F:RTS
  610.llef LDX#0:JSRprint:DEC&80:DEC&80:DEC&81:DEC&81:
JSRcustom:LDA&78:BEQjka:JSRcuuss:.jka JMPscroll
  620.RIGHT LDA&62:CMP#lef MOD256:BEQone:LDA&62:CMP#fo
r MOD256:BEQTWO:RTS
  630.rrig LDX#1:JSRprint:INC&80:INC&81:INC&992:LDA&99
2:CMP#3:BNEnn:INC&81:INC&80:LDA#0:STA&992:.nn JMPscrol
l
  640.TWO LDA#J% MOD256:STA&62:LDA#J% DIV256:STA&63:LD
A#2:STA&96F:RTS
  650.ENEPRIT
  660JSRfind:JSRplaneRUB:INC&82:JSRmove2:JSRfind
  670JMPplanp
  680.ENE LDA#&FF:STA&971:JSRin:CPX#0:BEQNDEE:JMPENEPR
IT:.NDEE LDA#0:STA&971:LDX&82:DEX:CPX&80:BNEjj:JSRfind
:JSRplaneRUB:.jj LDA&972:BNEmo:LDY&82:CPY&81:BEQloo:IN
Y:CPY&81:BEQloo
  690INY:CPY&81:BEQloo:INY:CPY&81:BEQloo:.mo INC&82:LD
A#0:STA&972:RTS
  700.loo LDA#&FF:STA&972:RTS
  710.planp LDA&78:CMP#&FF:BEQauu:LDY#0:.ua LDA(&4D),Y
:CMP#15:BEQdne:LDAEP,Y:STA(&4D),Y:INY:CPY#32:BNEua:.dn
e RTS:.auu LDY#0:.uai LDA(&4D),Y:CMP#15:BEQdne:LDAmis,
Y:STA(&4D),Y:INY:CPY#32:BNEuai:RTS
  720.find LDA#&20:STA&4D:LDA#&58:STA&4E:SEC:LDA&82:SB
C&80:TAX:LDY#0:.FG CPX#0:BEQHHS:CLC:LDA&4D:ADC#8:STA&4
D:LDA&4E:ADC#0:STA&4E:DEX:JMPFG:.HHS LDX&83:LDY#0:.gf
CPX#0:BEQhhS:CLC:LDA&4D:ADC#&40:STA&4D:LDA&4E:ADC#1:ST
A&4E:DEX:JMPgf:.hhS RTS
  730LDA&9B4:STA&82:LDA&9B5:STA&83:JSRin:CPX#&FF:BNEKk
4:DEC&82:DEC&82:JSRfind:JSRBOMrub::INC&82:INC&82:JSRfi
nd:JMPBOMpri:.Kk4 RTS
  740.planeRUB LDA&78:CMP#&FF:BNEiqw:SEC:LDA&4D:SBC#24
:STA&4D:LDA&4E:SBC#0:STA&4E:.iqw LDY#0:.UA LDA(&4D),Y:
CMP#15:BEQO1:LDA#240:STA(&4D),Y:.O1 INY:CPY#72:BNEUA:L
DA&78:CMP#&FF:BNEjo
  741CLC:LDA&4D:ADC#24:STA&4D:LDA&4E:ADC#0:STA&4E:.jo
RTS
  750.move2 LDA&78:CMP#&FF:BEQmnu:LDA&82:CLC:ADC#16:CM
P&80:BMIff6:LDX#&FF:.ff6 LDA&85:CMP#4:BEQup:INC&83:CPX
#&FF:BNEhh6:LDA&83:CMP&94F:BNEhh6:DEC&83:.hh6 LDA&83:C
MP#12:BEQrev:RTS:.up DEC&83:CPX#&FF:BNEjj6:LDA&83:CMP&
94F:BNEjj6:INC&83
  751.jj6 LDA&83:CMP#6:BEQrev:RTS
```

(continued on page 55)


·JONAH·
·BARRINGTON'S·
SQUASH
FEATURING
Reprosound
All the speed and excitement of championship squash is now available at your fingertips in a game so realistic – you'll need a shower afterwards!
Written with the help of Jonah Barrington, former World Squash Champion, the game keeps to the International Squash Racquet Federation rules as far as is possible. You serve in a 3D glass-backed court to play against your computer, or, using the game's two player option you can challenge a friend.
There are 4 levels of difficulty, and depending how fit you are you can play 1, 3 or 5 game matches! Check your score with the on screen display, but as your eyes are too busy watching the ball, Jonah Barrington acting as marker calls out the score for you. All this is due to a programming breakthrough that enables your computer to accurately reproduce the human voice without any hardware add-ons!
The game also incorporates a User Defined Joystick/Keys option which means that you can set your keyboard to suit you, or play with just about any make of joystick.
So get in training for this high- powered action game now.
It's your service next!
FOR
Commodore 64
and all
48K Spectrums
£7.95
New Generation Software
GSH
New Generation products are sold according to their terms of trade and conditions of sale.
FREEPOST, Bath BA2 4TD. Tel: 0225 316924

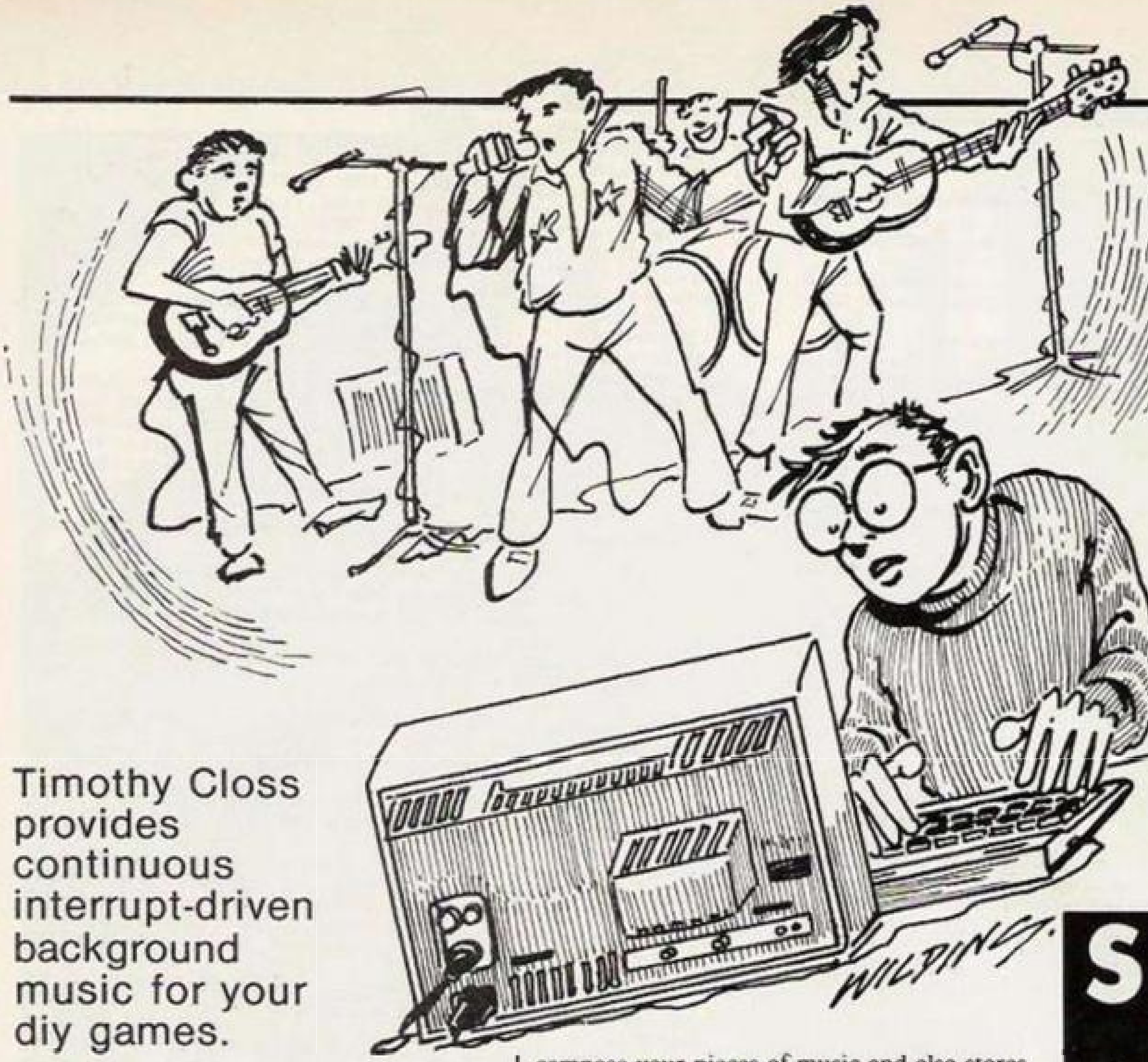
(continued from page 53)

```
760.rev LDA&85:EOR#12:STA&85:RTS
761.mnu LDA&7A:EOR#1:STA&7A:LDA&7A:CMP#0:BEQsik:LDA&83:CMP&94F:BMIpu:DEC&83:RTS:.pu INC&83:.sik RTS
780.SOU PHA:TYA:PHA:TXA:PHA:LDA#7:LDX#sou MOD256:LDY#sou DIV256:JSR&FFF1:PLA:TAX:PLA:TAY:PLA:RTS
790.dead LDA#&10:STAsou:LDA#2:STAsou+4:STAsou+6:JSRSOU:LDA#&11:STAsou:LDA#255:STAsou+4:LDA#5:STAsou+6:JSRMISIL
800LDA&94F:CMP#15:BEQdD1:LDA&96F:CMP#2:BNEeE1:JSRright:.eE1 LDA&96F:CMP#4:BNEl16:JSRleft:.l16 JSRrub:CLC:LDA&60:ADC#&40:STA&60:LDA&61:ADC#1:STA&61:INC&94F:JSRprint:JSRdelay:JMPdead:.dD1 RTS
810.custom LDY#0:.Bb4 LDA&9A4,Y:BEQbb4:LDA&9A0,Y:STA&82:LDA&9A1,Y:STA&83:TYA:PHA:JSRin:CPX#0:BEQAn:JSRCUSTOM:.An PLA:TAY:LDA&82:STA&9A0,Y:LDA&83:STA&9A1,Y:.bb4 INY:INY:INY:INY:INY:CPY&99C:BNEBb4
820LDA&9B4:STA&82:LDA&9B5:STA&83:DEC&82:DEC&82:JSRin:CPX#&FF:BNEL14:JSRfind:JSRBOMrub:INC&82:INC&82:JSRfind:JMPBOMpri:.L14 RTS
830.in LDX&80:INX:CPX&82:BPLnde:LDX&81:INX:CPX&82:BMInde:LDX#&FF:RTS:.nde LDX#0:RTS
840.enemy LDY#0:.Aa4 LDA&9A4,Y:BEQaa4:LDA&9A0,Y:STA&82:LDA&9A1,Y:STA&83:LDA&9A2,Y:STA&85:LDA&9A3,Y:STA&972:TYA:PHA:JSRENE:PLA:TAY:LDA&82:STA&9A0,Y:LDA&83:STA&9A1,Y:LDA&85:STA&9A2,Y:LDA&972:STA&9A3,Y:.aa4 INY:INY:INY:INY:INY:CPY&99C:BNEAa4
850RTS
860.CUSTOM DEC&82:DEC&82:JSRfind:JSRplaneRUB:INC&82:INC&82:JSRfind:JMPplanp
870.reset LDA#0:STA&9A0:STA&9A3:STA&9A8:STA&9AD:STA&9B2:LDA#13:STA&9A1:LDA#4:STA&9A2:LDA#10:STA&9A5:LDA#8:STA&9A6:LDA#8:STA&9A7:LDA#1:STA&9A4:STA&9A9:STA&9AE:STA&9B3:LDA#15:STA&9AA:LDA#6:STA&9AB:LDA#8:STA&9AC
880LDA#20:STA&9AF:LDA#2:STA&9B0:STA&9B1:LDA#1:STA&9B4:LDA#14:STA&9B5:LDA#0:STA&9B6:RTS
890.SEE LDY#0:.Cc4 LDA&9A4,Y:BEQcc4:LDA&9A0,Y:STA&82:LDA&9A1,Y:STA&83:STY&7F:TYA:PHA:JSRsee:PLA:TAY:.cc4 INY:INY:INY:INY:INY:CPY&99C:BNECc4:RTS
900.see JSRin:CPX#&FF:BNEDd4:JSRfind:LDY#0:.Ee4 LDA(&4D),Y:CMP#&FF:BEQhit:INY:CPY#32:BNEEe4:.Dd4 RTS:.hit LDA#0:LDY&7F:STA&9A4,Y:JSRdive:JMPscore
910.bomb LDA&9B4:STA&82:LDA&9B5:STA&83:JSRin:CPX#&FF:BNEGg4:JSRfind:JSRBOMrub:LDA&83:CMP#15:BEQHh4:INC&83:JSRfind:JSRBOMpri:LDA&82:STA&9B4:LDA&83:STA&9B5:.Jj4 RTS:.Gg4 LDX&82:CPX&80:BEQnnn6:LDX&82:DEX:CPX&80:BNEnn6:.nnn6 JSRfind:JSRBOMrub
911.nn6 LDA&9B5:CMP#15:BEQHh4:INC&9B5:RTS
920.Hh4 INC&83:JSRin:CPX#&FF:BNEo6:JSRfind:LDY#5:LDA(&4D),Y:BEQo6:LDX#&FF:STX&9F:LDY#0:JMPdd6:.o6 LDY#0:STY&9F:.dd6 LDA&9A4,Y:BNEee6:INY:INY:INY:INY:INY:CPY&99C:BNEdd6:.ee6 LDA&9A0,Y:TAX:INX:INX:STX&9B4:LDA&9A1,Y:TAX:INX:STX&9B5:LDX&9F:RTS
930.BOMrub LDY#0:.dd4 LDA(&4D),Y:CMP#15:BEQee4:LDA#240:STA(&4D),Y:.ee4 INY:CPY#32:BNEdd4:RTS:.BOMpri LDY#4:LDA(&4D),Y:CMP#15:BEQIi4:LDA#240:STA(&4D),Y:INY:LDA#0:STA(&4D),Y:INY:LDA#240:STA(&4D),Y:.Ii4 RTS
940.dive JSRfind:JSRPLAR:LDA&83:CMP#15:BEQNn4:INC&83:INC&82:JSRfind:JSRplanp:JSRdelay:JSRPLAP:JSRdelay:JMPdive:.Nn4 LDA&9B4:STA&82:LDA&9B5:STA&83:JSRin:CPX#&FF:BNEkk6:JSRfind:JSRBOMrub:.kk6 RTS
950.PLAR LDY#0:.Oo4 LDA(&4D),Y:CMP#15:BEQPp4:LDA#240:STA(&4D),Y:INY:CPY#48:BNEOo4:.Pp4 RTS:.PLAP LDY#0:.Qq4 LDA(&4D),Y:CMP#15:BEQPp4:LDAXP,Y:STA(&4D),Y:INY:CPY#32:BNEQq4:RTS
951.atom LDA#17:JSR&FFEE:LDA#1:JSR&FFEE:LDA#7:LDX#rad MOD256:LDY#rad DIV256:JSR&FFF1:LDA#28:JSR&FFEE:LDA#2:JSR&FFEE:LDA#15:JSR&FFEE:LDA#17:JSR&FFEE:LDA#1:JSR&FFEE:LDA#17:JSR&FFEE:LDA#131:JSR&FFEE:LDA#12:JSR&FFEE
952LDX#6:LDY#5:JSRpmus:LDX#4:LDY#9:JSRpmus:LDX#3:LDY#11:JSRpmus:LDX#3:LDY#11:JSRpmus:LDX#4:LDY#9:JSRpmus:LDX#6:LDY#5:JSRpmus
953LDA#8:STA&9F:.We7 LDX#7:LDY#3:JSRpmus:DEC&9F:LDA&9F:BNEWe7:LDA#26:JMP&FFEE:RTS
954.tech LDA#17:JSR&FFEE:LDA#129:JSR&FFEE:LDA#31:JSR&FFEE:LDX&B0:INX:INX:TXA:JSR&FFEE:LDA#30:JSR&FFEE:LDA#32:JSR&FFEE:JSRamo:DEC&B0:LDA&B0:CMP#&FF:BNEEr7:LDX#&FF:RTS:.Er7 LDX#0:RTS
955.R% LDA#32:STA&9F:.Rt7 JSRleft:DEC&9F:LDA&9F:BNERt7:LDA#32:STA&9F:.As7 JSRright:DEC&9F:LDA&9F:BNEAs7:RTS
956.amo LDA#17:JSR&FFEE:LDA#2:JSR&FFEE:LDA#31:JSR&FFEE:LDA#9:JSR&FFEE:LDA#30:JSR&FFEE:CLC:LDA&B1:LSRA:LSRA:LSRA:LSRA:CLC:ADC#128:JSR&FFEE:LDA&B1:AND#15:CLC:ADC#128:JMP&FFEE
957.score CLC:LDA&C2:ADC#5:STA&C2:CMP#10:BNEshow:LDA#0:STA&C2:INC&C1:LDA&C1:CMP#10:BNEshow:LDA#0:STA&C1:INC&C0
958.show LDA#17:JSR&FFEE:LDA#3:JSR&FFEE:LDA#31:JSR&FFEE:LDA#8:JSR&FFEE:LDA#31:JSR&FFEE:LDY#0:.uI7 CLC:LDA&C0,Y:ADC#128:JSR&FFEE:INY:CPY#4:BNEuI7:RTS
959.pmus LDA#31:JSR&FFEE:TXA:JSR&FFEE:LDA#14:JSR&FFEE:LDA#151:.Qw7 JSR&FFEE:DEY:BNEQw7:JSRdelay:LDA#10:JMP&FFEE
960.RISE LDA#7:LDX#Wh MOD256:LDY#Wh DIV256:JSR&FFF1:LDA&B1:STASu1+4:LDA#7:LDX#Su1 MOD256:LDY#Su1 DIV256:JMP&FFF1
961.MISIL LDA#&FF:STA&78:LDA&76:STA&82:LDA&77:STA&83:LDA&79:STA&972:JSRENE:LDA&82:STA&76:LDA&83:STA&77:LDA&972:STA&79:LDA#0:STA&78:INC&76:RTS
962.cuuss LDA#&FF:STA&78:LDA&76:STA&82:LDA&77:STA&83:JSRin:CPX#&FF:BNEgtf:JSRfind:JSRCUSTOM:LDA&82:STA&76:LDA&83:STA&77:.gtf LDA#0:STA&78:RTS
969]:NEXT
970?&906=13:CHAIN""
```

```
0*FX13,5
9VDU23,141,255,255,255,0,0,0,0,0
10*FX4,1
20GOSUB2000
30ENVELOPE1,1,-1,-12,1,1,20,10,126,0,0,-126,126,126
40DIMA$(4),HS$(5),HS(5),blo 4:FORT=1TO5:HS$(T)="vince...........":HS(T)=150:NEXT
41MODE5:VDU23;8202;0;0;0;19,0,2;0;19,2,0;0;:?&80=7:FORT=0TO3:T?&C0=0:NEXT:?&993=1:?&99C=5:lives=3:COLOUR130:CLS:GOSUB800:COLOUR129:CLS:REPEAT
50VDU23,131,0,0,112,112,112,112,0,0,23,132,0,0,14,14,14,14,0,0
60VDU23,133,0,112,112,112,115,7,7,7,23,134,0,14,14,14,206,224,224,224
70VDU23,135,0,102,102,102,0,24,24,24
80VDU23,136,1,3,7,15,31,63,127,255
90VDU23,137,255,254,252,248,248,224,192,128
100VDU23,138,1,2,4,8,16,32,64,128,23,139,1,1,1,1,1,1,1,1,23,140,0,1,1,1,1,1,1,1
120VDU23,142,0,0,0,240,140,159,253,66
130VDU23,143,0,0,0,0,3,0,0,0,23,152,198,133,197,133,198,56,40,40,23,153,196,132,135,5,87,80,80,112
150VDU28,2,15,17,1,17,130,12,26,30,2,30,17,16,17,128,12,26
160VDU23,128,0,123,123,0,0,0,0,0,23,129,0,195,195,0,60,60,60,60,23,130,0,222,222,0,0,0,0,0
170COLOUR0:COLOUR131:VDU31,0,17,128,129,130
180VDU31,12,26,128,129,130
190VDU31,12,18,133,134
200VDU31,3,23,131,132,31,3,24,131,132,31,3,25,133,134
210VDU31,7,24,131,132,31,7,25,131,132,31,7,26,133,134
220VDU31,2,25,135,31,9,26,135
230COLOUR129:VDU31,9,16,32,32
240VDU31,13,17,32
250VDU31,4,22,32
260VDU31,8,23,32
270VDU31,14,24,32,32,31,13,25,32,32
280COLOUR128:COLOUR1:VDU31,8,16,136,31,11,16,137
290VDU31,12,17,136,31,14,17,137
300VDU31,3,22,136,31,5,22,137
310VDU31,7,23,136,31,9,23,137
320VDU31,13,24,136,31,12,25,136
330VDU31,16,24,137,31,15,25,137
340VDU31,2,24,136,31,9,25,136,137
350COLOUR3:VDU31,11,17,138
360VDU31,14,18,138
370VDU31,5,25,138,31,5,24,139,31,5,23,139
380VDU31,10,26,138
390VDU31,15,26,138,31,14,25,139
400VDU31,9,24,139
410COLOUR2:PRINTTAB(2,28);STRING$(16,CHR$141);TAB(2,28);STRING$(16,CHR$141);
420VDU5,18,0,3:MOVE704,511:VDU140
430MOVE896,479:VDU140
440MOVE320,319:VDU140
450MOVE576,287:VDU140
460MOVE640,223:VDU140
470MOVE1024,254:VDU140
480GCOL0,3:MOVE448,483:VDU142:GCOL0,1:MOVE448,483:VDU143
490GCOL0,3:MOVE960,483:VDU142:GCOL0,1:MOVE960,483:VDU143
500VDU4
510GCOL0,2:X%=596:FORT%=447TO383 STEP-4
520MOVEX%,T%:DRAWX%+16,T%:X%=X%-4:NEXT
530X%=816:FORT%=415TO383 STEP-4
540MOVEX%,T%:DRAWX%+24,T%:X%=X%-4:NEXT
550X%=240:FORT%=191TO127 STEP-4
560MOVEX%,T%:DRAWX%+24,T%:X%=X%-4:NEXT
570X%=500:FORT%=159TO127 STEP-4
580MOVEX%,T%:DRAWX%+24,T%:X%=X%-4:NEXT
590X%=852:FORT%=159TO127 STEP-4:MOVEX%,T%:DRAWX%+16,T%:X%=X%-4:NEXT
591VDU23,128,0,254,130,130,134,134,134,254,23,129,0,4,4,12,12,12,12,12
592VDU23,130,0,240,136,0,240,128,152,240,23,131,0,120,0,0,124,12,12,124
593VDU23,132,0,240,136,136,232,252,0,0,23,133,0,252,100,120,252,12,140,252
594VDU23,134,0,240,136,128,240,136,152,240,23,135,0,240,136,0,24,24,24,24
595VDU23,136,0,124,68,68,254,198,198,254,23,137,0,252,196,196,252,4,132,252
600VDU19,2,0;0;:IF lives<>3 THEN 610 ELSE:COLOUR130:COLOUR0:PRINTTAB(2,10);"Jump Jet Assault":CALLR%:FORT=0TO1000:NEXT:PRINTTAB(2,10);SPC16
610VDU4,17,3,17,128,30
630ENVELOPE4,1,-1,-2,3,1,2,100,0,0,0,0,0,0
640?&81=64:A$=CHR$(lives+128)
650COLOUR129:PRINTTAB(2,30);STRING$(?&80,CHR$150);TAB(15,30);A$:COLOUR2:PRINTTAB(3,29);"Techs"TAB(13,29);"Lives":CALLI%:lives=lives-1:UNTIL lives=0 OR ?&80=255
660A$="":FORT=0TO3:A$=A$+STR$(T?&C0):NEXT:SC=VALA$
670*FX15,5
680IF ?&80<>255 THEN 770
690VDU19,3,0;0;19,1,0;0;
700*FX9,2
710*FX10,2
720FORT=0TO50:SOUND1,4,(T MOD255),1:NEXT:SOUND0,-15,4,5:COLOUR131:CLS:FORG=0TO90:NEXT:COLOUR130:CLS:VDU19,3,7;0;19,1,1;0;
730A$(0)="Status Report":A%=RND(6):A$(1)="Dead...."+STR$A%+"000,000":A%=RND(4):A$(2)="Wounded...."+STR$A%+"00,000":A$(3)="Cause....Melt Down":A$(4)="Island ...DESTROYED"
740col=0:FORT=0TO4:L%=LENA$(T):X%=(20-L%)/2:X%=X%-1:FORT%=1TOLENA$(T):COLOUR130::COLOURcol:PRINTTAB(X%+T%,3+(T*3));MID$(A$(T),T%,1);:COLOURcol+128:VDU32:SOUND&11,1,2,1:FORG=0TO90:NEXT,:COLOUR130:VDU8,32:col=col+1:IF col=2 col=3
750PROCclik:NEXT
760COLOUR1:PRINTTAB(2,4);STRING$(15,CHR$141);:FORG=0TO5000:NEXT
770VDU19,3,7;0;
780*FX15,5
790COLOUR130:CLS:PROChigh:GOTO41
800COLOUR3:PRINTTAB(0,29);"PRESS THE  SPACE BAR"
810A$=STRING$(20,".")+"Play.`Jump Jet Assault`.................if.you.dare..................only.the.fastest.survive.in.a.game.of.courage.and.stamina................JUMP JET ASSAULT.a.game.for.the.nuclear.age...where.a.mistake.could.destroy.millions."
820COLOUR1:PRINTTAB(2,3);"JUMP JET ASSAULT":COLOUR0:PRINTTAB(1,4);STRING$(18,CHR$141);
830COLOUR3:PRINT'''"A game of  skill and    determination":COLOUR1:PRINTTAB(1,20);"WRITTEN BY B LEWIS"
840*FX15,6
850COLOUR0
860T%=1
870PRINTTAB(0,15);MID$(A$,T%,20);
880I$=INKEY$(7):IF I$=" " THEN 900
890T%=T%+1:IF T%=LENA$ T%=1:GOTO 870 ELSE GOTO870
900*FX21,5
910FORG=0TO100:NEXT:FORT%=1TO5:SOUND1,1,T%*51,2:NEXT:RETURN
920DEFPROChigh:T=1
930IF SC>HS(T) THEN 960
940T=T+1:IF T<>6 THEN 930
950GOTO1000
960IF T=5 THEN 990
970FORG%=5TOT STEP-1:HS(G%)=HS(G%-1):HS$(G%)=HS$(G%-1):NEXT
980HS(T)=SC:PROCname:HS$(T)=A$
990A=15-LENHS$(T):HS$(T)=HS$(T)+STRING$(A,"."):CLS
1000COLOUR0:PRINTTAB(1,3);STRING$(18,CHR$141);:COLOUR1:PRINTTAB(2,2)"High Score Table"
1010FORTX=1TO5:IF HS(TX)<950 THEN X=1 ELSE X=0
1020IF TX=T THEN COLOUR3 ELSE COLOUR1
1030PRINTTAB(X,(TX*3)+4);HS$(TX):COLOUR0:PRINTTAB(15+X,(TX*3)+4);HS(TX):NEXT
1040COLOUR3:PRINTTAB(0,29);"PRESS THE  SPACE BAR":REPEAT:UNTILINKEY-99:CLS:FORTX=1TO5:SOUND1,4,100-TX*3,1:NEXT:ENDPROC
1050DEFPROCname:COLOUR0:COLOUR130:PRINTTAB(3,3);STRING$(14,"-");:EX=0:DX=1:LX=0:CX=65:XX=0:YX=7
1060COLOUR3:PRINTTAB(1,22);"ENTER IN YOUR NAME":COLOUR1:PRINTTAB(5,24);"USING FIRE":COLOUR0:PRINTTAB(3,26);"LEFT AND RIGHT"TAB(2,4);STRING$(16,CHR$141);:COLOUR3:PRINTTAB(5,31);"Good Play!";
1070PRINTTAB(0,7);"A B C D E F G H I J"TAB(0,9);"K L M N O P Q R S T"TAB(0,11);"U V W X Y Z . / ";CHR$153;" ";CHR$152
1080COLOUR0:COLOUR131:VDU31,XX,YX,CX
1090A$=INKEY$(0):IF A$="," PROCleft
1100IF A$="." PROCright
1110IF A$="M" PROCprint
1120IF EX=1 THEN 1240
1130GOTO1080
1140DEFPROCleft:COLOUR130:COLOUR3:VDU31,XX,YX,CX:XX=XX-2:IF XX=-2 YX=YX-2:XX=18:IF YX=5 YX=11
1150SOUND&11,4,2,1:VDU31,XX,YX:A%=135:!blo=USR(&FFF4):CX=blo?1:ENDPROC
1160DEFPROCright:COLOUR130:COLOUR3:VDU31,XX,YX,CX:XX=XX+2:IF XX=20 YX=YX+2:XX=0:IF YX=13 YX=7
1170GOTO1150
1180DEFPROCprint:IF CX=152 OR CX=153 THEN 1220
1190IF LX=14 ENDPROC
1200SOUND&11,1,255,5:COLOUR130:COLOUR1:VDU31,LX+3,3,CX:LX=LX+1
1210ENDPROC
1220SOUND&11,1,255,5:IF CX=152 EX=1:ENDPROC
1230IF LX=0 ENDPROC ELSE COLOUR130:COLOUR0:LX=LX-1:PRINTTAB(LX+3,3);"-":ENDPROC
1240COLOUR130:COLOUR1:A$="":FORTX=0TOLX-1
1250VDU31,TX+3,3:!blo=USR(&FFF4):A$=A$+CHR$(blo?1):NEXT:ENDPROC
1260DUMMY
2000MODE4:VDU23;8202;0;0;0;:PRINTTAB(10,5);"Instructions (Y/N) ?"
2010A$=GET$:IF A$<>"Y" AND A$<>"N" THEN 2010
2020IF A$="N" RETURN
2030CLS:PRINTTAB(12,3);"Jump Jet Assault"TAB(11,4);STRING$(18,CHR$141)

2040PRINT"You are the soul defender of the nuclearplant on three mile island.The SOVIETS  realise that you are the weak link in   the WEST'S defence network,and so set   about attacking the plant."
2050PRINT'"Your only form of defence is the HARRIERyou are sitting in.This can carry fifty bullets which will destroy any enemy    aircraft you might encounter.To reload  simply land on a building similiar to   the you started from."
2060PRINT"If the enemy drop a bomb on the afore-  mentioned buildings you losea technicianlose all your 'TECHS' and its goodbye. You also die if the planes hit you or   bomb you.Once there are three or more"
2061PRINT"enemy planes a misile will be launched  which cannot be destroyed only dodged,  this misisle travels at twice the speed of the other planes and so you cannot   catch it"

2070PRINT'"The controls are:-"
2080PRINTTAB(3);"A - UP,Z - DOWN,< - RIGHT,> - LEFT"
2090PRINT'TAB(16);"M - FIRE";
2100PRINT''TAB(10);"PRESS SPACE FOR GAME";
2110REPEAT:UNTILINKEY-99:RETURN
2111DEFPROCclik
2112*M.1
2113FORG=0TO50:NEXT
2114*M.0
2115ENDPROC
2120DUMMY
```



SPECTRUM BACKBOOGIE

Timothy Closs provides continuous interrupt-driven background music for your diy games.

HOW MANY times have you wished you could boost your games programs with some background music as in Manic Miner, Automania and Gilligan's Gold? Well, now your wish has been granted with Backboogie!

Backboogie will repeatedly play a piece of music, short or long, without interfering with the running of your own programs!

The program itself is 100 per cent machine-code and uses the Spectrum's interrupt system to run it. As a lengthy discussion about the system is not needed here, I will just say that the Spectrum can be made to run a machine-code program stored at a certain memory address every 1/50th second — this process is known as an "interrupt".

The Basic program in listing 1 helps you compose your pieces of music and also stores some necessary data in the memory.

Let me explain how the program works. The music you compose is stored as a series of numbers, each representing one note, i.e.:

```
0  for  C
1  for  C#
2  for  D,  etc.
```

The Spectrum's own program for converting these numbers into values the Sound Generation Rom Routine can accept is too slow, so I have developed a faster routine using the data stored by the Basic program.

Having calculated these values, Backboogie calls the Sound Generation Rom Routine to produce a short musical sound before returning to your game.

Listing 1.

```
   1 LOAD ""CODE
   2 REM ***BACKBOOGIE***
   3 REM *******BY*******
   4 REM ****TIM*CLOSS***
   5 CLS
  10 GO SUB 1000
 500 LET G=60672
 505 RESTORE 2000: FOR H=1 TO 21
: READ K$: PRINT AT H,0;K$;AT H,30;K$: NEXT H
 510 LET A=2: LET B=21
 512 PRINT AT B,A; PAPER 0;" "
 513 IF INKEY$="7" AND B>1 THEN LET B=B-1
```

(continued opposite)

(listing 1 continued)

```
 515 IF INKEY$="6" AND B<21 THEN
 PRINT AT B,A; PAPER 7;" ": LET
B=B+1
 516 IF INKEY$="1" AND A>2 THEN
LET G=G-8: LET A=A-1
 520 IF INKEY$="0" THEN GO TO 53
5
 525 IF INKEY$="E" THEN GO TO 56
0
 530 GO TO 512
 535 FOR H=G TO G+7: POKE H,22-B
: NEXT H: LET G=G+8
 540 LET A=A+1: IF A=30 THEN LET
 H=USR 60148: LET A=29
 545 FOR J=21 TO B STEP -1: PRIN
T AT J,A; PAPER 0;" ": NEXT J
 550 GO TO 512
 560 LET O=G-60672-2: POKE 60250
,INT (O/256): POKE 60267,O-((INT
 (O/256))*256)
 570 STOP
1000 RESTORE 3000
1010 FOR H=0 TO 20
1020 READ J: POKE 60416+H*4,0: P
OKE 60417+H*4,(J/96)
1030 LET K=437500/J-30.125: POKE
 60418+H*4,INT (K/256): POKE 604
19+H*4,K-((INT (K/256))*256)
1040 NEXT H
1050 RETURN
2000 DATA "G#","G","F#","F","E",
"D#","D","C#","C","B","A#","A","
G#","G","F#","F","E","D#","D","C
#","C"
3000 DATA 261.63,277.18,293.66,3
11.13,329.63,349.23,369.99,392,4
15.3,440,466.16,493.88,523.25,55
4.36,587.32,622.24,659.24,698.44
,739.97,783.97,830.58,879.97
```

The game then continues running until, 1/50th second later, it is necessary to produce another musical sound of the same frequency as before. When a series of short sounds is heard in quick succession like this they give the impression of a continuous musical note.

The composer allows any note within a range from middle C up to 20 semitones above to be entered. Use keys 6 and 7 to move the bar up and down until it is level with the desired pitch. Pressing 0 will now enter the note and the bar will move across one column. You can delete a note by pressing 1 — the bar will move back one column. Continue entering your notes until you have finished your composition.

Pressing E will add final specifications to the machine-code routine and then cause you to escape from the Basic composer program.

Your music can now be saved, together with all the other necessary data and routines by typing:

SAVE "BACKBOOGIE" CODE 60180,0 + 500

and loaded by typing:

LOAD "" CODE

To "switch on" your music during a program, include:

POKE 65534, 0: POKE 65535, 237: POKE 65532, 0: POKE 65533, 0
RANDOMIZE USR 60180

To "switch off" your music, include:

RANDOMIZE USR 60190

First, enter the composer program in listing 1 and save it by typing:

SAVE "COMPOSER" LINE 1

Now New the program and type in listing 2. Run the program and enter the code in listing 3, working from left to right and from type to bottom. When you have finished, the code will automatically be saved as Boogie.



If you do not wish to type in all the programs and code yourself, send a blank cassette, SAE and £1 to me at: 5 Western Drive, Shepperton, Middlesex TW17 8HJ.

Listing 2.

```
 10 DEF FN H(H$)=16*(CODE H$(1)
-48-(7 AND H$(1)>"9"))+CODE H$(2
)-48-(7 AND H$(2)>"9")
 40 FOR N=60148 TO 60288 STEP 8
 50 LET T=0
 60 PRINT N;" : ";
 70 INPUT H$: PRINT H$;
 80 FOR B=0 TO LEN H$-1 STEP 2
 90 LET Z=FN H(H$): LET T=T+Z
 100 POKE N+B/2,Z
 110 LET H$=H$(3 TO )
 120 NEXT B
 130 PRINT " = ";: INPUT Y: PRIN
T Y
 140 IF Y<>T THEN PRINT "INPUT E
RROR - TRY AGAIN": GO TO 50
 150 NEXT N
```

Listing 3.

```
60148 : 2102581103580616 = 259
60156 : C5061C1A77231310 = 446
60164 : FA23232323131313 = 447
60172 : 13C110ECC9000000 = 665
60180 : ED5E3E30ED47C900 = 950
60188 : 0000ED56C9000000 = 524
60196 : 0000000000000000 = 0
60204 : 00000000E5D5C5F5 = 884
60212 : 2AFEFF7ECB27CB27 = 1161
60220 : E56F26000100ECED = 852
60228 : 4A56235E2346234E = 507
60236 : 6069CDB503E12322 = 884
60244 : FEFF2AFCFF3E00BC = 1308
60252 : 280C2322FCFFF1C1 = 1062
60260 : D1E1FBC338003E26 = 1036
60268 : BD380218ED210000 = 541
60276 : 22FCFF2100ED22FE = 1099
60284 : FF18E30000000000 = 506
```

THE



BBC

In this, the first part of his article, Fintan Culwin details a BBC editor with a simple background music facility.

THIS STARTED off as a seemingly simple editor. What I wanted was a means of preparing a data file which could be used by an assembler program to produce an interrupt driven tune. Once the code produced by the assembler had been installed, the tune would repeat itself until it was deactivated or the Break key pressed.

The problem with preparing a musical data file is that there needs to be a method of specifying the pitch and duration of the notes. Standard musical notation turned out to be the most sensible system to produce the file. Although this editor is based upon musical notation it is not presented as a music processor. It has a limited range of notes and, in particular, no capacity for a rest. It is, however, capable of producing simple tunes for accompanying games etc.

To make full use of the BBC's sound capacity it is not only necessary to manipulate the Sound command but also the Envelope command. Consequently, an envelope editor has been added to the system. Provision for a screen dump was included to allow the editor to produce sheet script.

What started out as a supposedly simple editor to produce a small data file became a fairly sophisticated project in its own right. The editor can cope with up to 200 notes over a one and a half octave range. The envelope can be modified over its full range; and will be saved with any data file produced.

Piano type envelope

To use the system enter listing 1, Intload and listing 2, Inttune. Running Intload will define the characters needed for the main program and produce a default piano type envelope. The characters are printed as a check and the second program loaded. For disc users the name of the second program will have to be defined, for tape users a blank Chain "" statement will load the next program on the tape.

When loaded the editor presents the user with a blank page. To define a note its pitch and duration have to be selected. The pitch of the note is controlled by the cursor's position on the stave. The cursor can be moved up and down the stave using the up and down arrow keys. The left and right arrow keys move the cursor backwards and forwards through the tune.

The duration of the note is indicated by the symbol in the lower right hand corner. The duration can be increased with the f0 key and decreased with the f1 key. A note is entered at the current cursor position by pressing Return. If the cursor is in the middle of a tune all succeeding notes will be shifted along to make space for the note being inserted.

If a note needs to be deleted, pressing the Delete key will remove the note from underneath the current cursor position and move back any succeeding notes. There is space on a page for 20 notes. Moving before or beyond this automatically takes you onto the next page. If this is too pedestrian then keys f5 and f6 will move backward and forward one page at a time. Pressing f2 will play all the current tunes using the current envelope.

After coming to terms with the musical setting the envelope editor can be invoked by pressing the f7 key. To understand the screen it is necessary to consult the User Guide. Page 245 identifies the effects of the 13 parameters and labels them. These labels are reproduced on the screen, alongside the current value of the parameter. The currently selected parameter is highlighted in inverse video.

A table of 13 numbers is almost impossible to comprehend. Above the table the settings of the parameters are indicated by 12 bar-graphs split into four clusters. They are grouped as the PI parameters, the PN parameters, the AA,AS & AR parameters and the ALA and ALD parameters. A description of the effects of changing these parameters is given in the User Guide.

A practical appreciation can be obtained by experimentation. A parameter to be changed is highlighted using the left and right arrow keys. The value is changed within its limits using the up and down arrow keys. Pressing the Return key will sound the envelope; when you are satisfied pressing the Escape key will return to the music editor. The current envelope specification will be saved and recalled with any tune.

Pressing f8 causes a printer dump to be performed. In the configuration given page 10 of memory — &A00 to &AFF — is assumed to be available for use. This is acceptable for disc users, tape users will have to use page 14 — &D00 to &DFF. Examining listing 2 shows a dummy RTS code has been inserted.

If you want to use this facility then the Remmed *Load command will have to be activated, to load into memory your own screen dump code; and the dummy RTS command removed. This can be omitted if screen dumps are not required. When you are ready to leave the system f9 will cause an orderly return to Basic.

The basis of the editor is a list of note codes held in memory. Each note requires two bytes to define its duration and pitch. These are held in memory in the reserved byte array labelled tune%, defined and initialised within PROC prepare. The only obscure parts of the preparation are the definition of an Osword area which will be used to obtain character definitions for the double height plotting routine.

Retrieved from memory

There is no legitimate method to obtain an envelope definition within the operating system. Consequently the envelope parameters have to be retrieved from memory into the envelope% array using Peeks.

The first part of the main listing, as far as PROC MAIN contains various procedures concerned with screen operations. The most transportable procedure is PROC bigchar, whose parameter identifies a character to be plotted on a screen in double height. Using this procedure mollifies the effect of being forced to work in 20 column mode.

Listing 1.

```
 10 REM INT'LOAD
 20 REM EDITOR LOADER
 30 REM FINTAN CULWIN
 40 REM APRIL '05
 90 MODE4
100VDU23,240,16,20,18,16,104,120,120,48
110VDU23,241,48,120,120,104,16,18,20,16
120VDU23,242,16,20,18,16,104,121,120,48
130VDU23,243,48,120,121,104,16,18,20,16
140VDU23,244,16,16,16,16,104,120,120,48
150VDU23,245,48,120,120,104,16,16,16,16
160VDU23,246,16,16,16,16,104,121,120,48
170VDU23,247,48,120,121,104,16,16,16,16
180VDU23,248,16,16,16,16,104,88,72,48
190VDU23,249,48,72,88,104,16,16,16,16
200VDU23,250,16,16,16,16,104,89,72,48
210VDU23,251,48,72,89,104,16,16,16,16
220VDU23,252,0,0,0,56,60,72,112,0
230VDU23,253,0,0,0,56,68,73,112,0
240ENVELOPE4,3,0,0,0,0,0,0,121,-10,-5,
  -2,120,120
250FOR line= 1 TO 10
260   FOR char = 240 TO 253
270     VDU char,32
280     NEXT char
290   VDU 13,10,10
300NEXT line
310FOR pitch = 97 TO 177 STEP 8
320   SOUND 1,4,pitch,5
330NEXT pitch
340 PAGE=&1900
350 *K.10 PA.=&1900:MO.:M
360 CHAIN ""
```

BEEBSKI BEAT



The procedure works by obtaining a character definition with an Osword call. The definition obtained is used to redefine character 254 twice using the VDU 23 command; and sent to the screen.

The main routine is fairly straightforward; the key presses are trapped and used to select a routine from the second part of the program.

When loading a tune from disc or tape there is an option to load from the start of memory overwriting the tune in memory or appended to the end of the tune in memory. The envelope editor PROC-envel and associated procedures are extractable and can be used alone to investigate the envelope command.

As the program is reasonably structured, the routines are well Remmed and the variable names are sensibly chosen implementation should be fairly easy. I have not tested it but it should transfer directly to the Electron.

As mentioned at the beginning this was conceived as a simple editor that would be used to produce a file for an assembler program. The editor has grown into a more sophisticated system than I envisaged; but it still performs its intended function.

Keep hold of your data files, next month's program will use them as input to a system which will install the tunes into the micro. Consequently, the tune will repeat itself indefinitely until switched off or the machine is reset. This has obvious if rather tedious applications.

Listing 2.

```
100MODE5
140PROC_PREPARE
150PROC_PAGE
160PROC_CURSOR(count)
170REPEAT
180PROC_MAIN
190UNTILend
200PROC_FINISH
210END
1000DEFPROC_PREPARE
1040dump%=&A00
1050?dump%=&60
1060DIMnote$(7,1),pitch(12),len
f(7),envel%(13),envel$(13),min(1
2),max(12)
1070FORnote=0TO7
1080note$(note,0)=CHR$(240+note
*2)
1090note$(note,1)=CHR$(241+note
*2)
1100NEXTnote
1110note$(7,0)=CHR$(253)
1120note$(7,1)=CHR$(253)
1130note$(6,1)=CHR$(252)
1140FORnum=1TO12:READpitch(num)
:NEXT
1150FORnum=0TO7:READlenf(num):N
EXT
1160*FX 4,2
1170*FX 225,240,0
1180*FX 229,1,0
1190VDU23,0,10,96,0;0;0;
1200VDU19,1,7;0;
1210VDU19,2,3;0;
1220VDU19,3,11;0;
1230DIMtune%400
1240FORN%=tune%TOtune%+400:?N%=
0:NEXTN%
1250mxtune=tune%:ptr=tune%:coun
t=1
1260cpage=0:level=6:note=3
1270end=FALSE
1280OSWORD=&FFF1:DIMosword%8
1290X%=osword%MOD256:Y%=osword%
DIV256:A%=&A
1300*FX 4,1
1310temp=&8F0:FORpar=0TO13:enve
l%(par)=temp?par:NEXTpar
1320FORpar=0TO12:READmin(par):N
EXT
1330FORpar=0TO12:READmax(par):N
EXT
1340FORpar=0TO12:IFmin(par)<0TH
ENenvel%(par)=FN_comp(envel%(par
))
1350NEXTpar
1360FORpar=0TO12:READenvel$(par
):NEXT
1370VDU24,400;956;860;1023;18,0
,130,5,16.
1380VDU18,0,0:temp$="IN'TUNE":F
ORloop=1TOLEN(temp$)
1390PLOT4,352+loop*64,1016:PROC
bigchar(MID$(temp$,loop,1)):NEX
Tloop
1400ENDPROC
1500DEFPROC_FINISH
1510CALL!-4
1520ENDPROC
1900DEFPROC_PAGE
1910VDU24,0;0;1279;868;18,0,128
,16
1920PROC_DISP
1930PROC_note(note)
1940GCOL0,1:PLOT4,8,36:PRINT"PA
GE ";
1950GCOL3,2:PLOT4,320,36:PRINTS
TR$(cpage+1)
1960PROC_fill(cpage)
1970count=1
1980ENDPROC
2000DEFFN_comp(byte)
2010IF(byteAND&80)<>&80THEN=byt
e
2020IFbyte=0THEN=0ELSE=(byte-25
6)
2100DEFPROC_DISP
2110VDU24,0;256;1279;920;
2120PROC_STAVE(1):PROC_STAVE(2)
2130ENDPROC
2200DEFPROC_STAVE(num)
2210GCOL0,1
2220IFnum=1THENnum=816ELSEnum=4
96
2230FORoffset=0TO4
2240pos=num-32*offset
2250PLOT4,64,pos:PLOT1,996,0
2260NEXToffset
2270GCOL0,2
2280ENDPROC
2300DEFPROC_note(num)
2310VDU24,1200;0;1279;72;18,0,1
30,16,26,
2320VDU18,0,0,25,4,1208;64;:PRO
C_big(num,0)
2330VDU18,0,2:ENDPROC
2400DEFPROC_CURSOR(cpos)
2410IFcpos>10THENypos=416:cpos=
cpos-10ELSEypos=736
2420ypos=ypos+(level-6)*16
2430xpos=cpos*96+16
2440VDU24,xpos;ypos;xpos+32;ypo
s+32;18,3,131,16,18,0,2,26
2450ENDPROC
2500DEFPROC_fill(page)
2510tcount=count:tptr=ptr
2520offset=40*page+tune%
2530IF?offset=0THENENDPROC
2540disp=1::count=1
2550REPEAT
2560PROC_onenote(count,?offset,
offset?1)
2570offset=offset+2:count=count
+1
2580UNTILcount=21OR?offset=0
2590ENDPROC
2600DEFPROC_onenote(num,pitch,d
uration)
2610GCOL0,2
2620IFnum>10THENy=480:num=num-1
0ELSEy=800
2630x=32+num*96
2640yoff=(pitch-6)*16
2650PLOT4,x,y+yoff
2660IFpitch>8THENdir=1ELSEdir=0
2670PROC_big(duration-1,dir)
2680ENDPROC
2700DEFPROC_big(note,dir)
2710IFnote>7THENENDPROC
2720char$=note$(note,dir)
2730IFdir=1THENPLOT0,0,-32
2740PROC_bigchar(char$)
2750ENDPROC
2800DEFPROC_bigchar(char$)
2810?osword%=ASC(char$):CALLOSW
ORD
2820VDU23,254
2830FORkount=1TO4
2840VDUosword%?kount,osword%?ko
unt
2850NEXTkount
2860VDU254,10,8
2870VDU23,254
2880FORkount=5TO8
2890VDUosword%?kount,osword%?ko
unt
2900NEXTkount
2910VDU254
2920ENDPROC
3000DEFPROC_MAIN
3010*FX 21,0
3020resp=GET
```

(continued on next page)

(continued from previous page)

```
3030IFresp=139THENPROC_UP(1)
3040IFresp=138THENPROC_UP(-1)
3050IFresp=240THENPROC_CHANGE(1
)
3060IFresp=241THENPROC_CHANGE(-
1)
3070IFresp=13THENPROC_enter
3080IFresp=137THENPROC_right(1)
3090IFresp=136THENPROC_right(-1
)
3100IFresp=242THENPROC_play
3110IFresp=243THENPROC_save
3120IFresp=244THENPROC_load
3130IFresp=245THENPROC_mpage(-1
)
3140IFresp=246THENPROC_mpage(1)
3150IFresp=247THENPROC_envel
3160IFresp=127THENPROC_del
3170IFresp=249THENPROC_quend
3180ENDPROC
3900DEFPROC_quend
3910PROC_window
3920PRINT'"  End (Y/N) ? ":
3930REPEAT
3940quend=GETAND223
3950UNTILquend=78ORquend=89
3960IFquend=89THENend=TRUE
3970PROC_nowindow
3980ENDPROC
4100DEFPROC_UP(dir)
4110IFlevel+dir>12ORlevel+dir<1
THENENDPROC
4120PROC_CURSOR(count)
4130level=level+dir
4140PROC_CURSOR(count)
4150ENDPROC
4200DEFPROC_CHANGE(dir)
4210IFnote+dir>7ORnote+dir<0THE
NENDPROC
4220note=note+dir
4230PROC_note(note)
4240ENDPROC
4300DEFPROC_enter
4310IFptr>mxtuneORmxtune=tune%+
400THENENDPROC
4320IFmxtune=ptrTHENPROC_endELS
EPROC_mid
4330SOUND1,4,pitch(level),lenf(
note)
4340ENDPROC
4400DEFPROC_end
4410?ptr=level:ptr?1=note+1
4420PROC_onenote(count,level,no
te+1)
4430PROC_right(1)
4440mxtune=ptr
4450ENDPROC
4460DEFPROC_mid
4470temp=mxtune-2
4480REPEAT
4490?(temp+2)=?(temp):?(temp+3)
=?(temp+1)
4500temp=temp-2
4510UNTILtemp=ptr-2
4520?ptr=level:ptr?1=note+1
4530mxtune=mxtune+2
4540tcount=count:PROC_PAGE:coun
t=tcount:PROC_CURSOR(count)
4550ENDPROC
4600DEFPROC_right(rit)
4610IFptr=mxtune+2ANDrit=1THENE
NDPROC
4620IFptr=tune%ANDrit=-1THENEND
PROC
4630PROC_CURSOR(count)
4640IFcount+rit<1ANDcpage>0cpag
e=cpage-1:PROC_PAGE:count=21
4650IFcount+rit>21ANDcpage<19cp
age=cpage+1:PROC_PAGE:count=1
4660count=count+rit
4670PROC_CURSOR(count)
4680ptr=ptr+rit*2
4690ENDPROC
4700DEFPROC_play
4710temp=tune%
4720REPEAT
4730SOUND&1,4,pitch(?temp),lenf
((temp?1)-1)
4740temp=temp+2
4750UNTIL?temp=0
4760ENDPROC
4800DEFPROC_del
4810IF?ptr=0THENENDPROC
4820FORtemp=ptrTOmxtune+2STEP2
4830?temp=temp?2:temp?1=temp?3
4840NEXTtemp
4850mxtune=mxtune-2
4860PROC_CURSOR(count)
4870PROC_PAGE
4880count=tcount:ptr=tptr
4890PROC_CURSOR(count)
4900ENDPROC
5000DEFPROC_save
5010IFtune%=mxtuneTHENENDPROC
5020PROC_window
5030INPUT"Filename ",file$
5040IFLEN(file$)=0THENPROC_nowi
ndow:ENDPROC
5050channel=OPENOUTfile$
5060FORpar=0TO12
5070BPUT#channel,envel%(par)
5080NEXTpar
5090FORloop=tune%TOmxtune-2STEP
2
5100BPUT#channel,?loop
5110BPUT#channel,(loop?1)
5120NEXTloop
5130CLOSE#channel
5140PROC_nowindow
5150ENDPROC
5300DEFPROC_load
5310over=FALSE
5320PROC_window
5330INPUT"Filename ",file$
5340IFLEN(file$)=0THENPROC_nowi
ndow:ENDPROC
5350IFmxtune>tune%THENPROC_quer
y
5360IFover=FALSETHENloop=mxtune
ELSEloop=tune%
5370channel=OPENUPfile$
5380FORpar=0TO12
5390envel%(par)=BGET#channel
5400NEXTpar
5410REPEAT
5420?loop=BGET#channel
5430loop?1=BGET#channel
5440loop=loop+2
5450UNTILEOF#channelORloop=tune
%+400
5460IFloop<tune%+400THEN!loop=0
5470mxtune=loop
5480PROC_nowindow
5490PROC_PAGE:count=tcount:PROC
_CURSOR(count)
5495ENVELOPE4,envel%(0),envel%(
1),envel%(2),envel%(3),envel%(4)
,envel%(5),envel%(6),envel%(7),e
nvel%(8),envel%(9),envel%(10),en
vel%(11),envel%(12)
5500ENDPROC
5600DEFPROC_query
5610PRINT"overwrite (Y/N) ":
5620REPEAT:onse=GETAND223
5630UNTILonse=89ORonse=78
5640IFonse=89THENPRINT"yes"ELSE
PRINT"no"
5650IFonse=89THENover=TRUE
5660PRINT"Loading....."
5670ENDPROC
5700DEFPROC_window
5710VDU24,0;128;1279;288;18,0,1
30,16,
5720VDU18,0,0,25,4,96;240;
5730ENDPROC
5750DEFPROC_nowindow
5760VDU18,0,128,16,26
5770ENDPROC
5900DEFPROC_mpage(dir)
5910IFcpage+dir<0ORcpage+dir>20
THENENDPROC
5920IFdir=1ANDptr+40>mxtuneTHEN
ENDPROC
5930ptr=ptr+dir*40:cpage=cpage+
dir
5940PROC_PAGE
5950count=tcount:PROC_CURSOR(co
unt)
5960ENDPROC
6000DEFPROC_envel
6010VDU24,0;0;1279;868;18,0,128
,16
6020FORpar=0TO12STEP2
6030PLOT4,0,320-par*24:PRINTenv
el$(par)
6040PLOT4,300,320-par*24:PRINTS
TR$(envel%(par))
6050PLOT4,620,320-par*24:PRINTe
nvel$(par+1)
6060IFpar<>12THENPLOT4,920,320-
par*24:PRINTSTR$(envel%(par+1))
6070NEXTpar
6080FORpos=1TO12:PROC_bar(pos):
NEXTpos
6090pos=5:PROC_hlt
6100REPEAT
6110*FX 21,0
6120resp=GET
6130IFresp=139THENPROC_inc(1)
6140IFresp=138THENPROC_inc(-1)
6150IFresp=137THENPROC_move(1)
6160IFresp=136THENPROC_move(-1)
6170IFresp=13THENPROC_sound
6180UNTILresp=27
6190PROC_PAGE:count=tcount
6195ENVELOPE4,envel%(0),envel%(
1),envel%(2),envel%(3),envel%(4)
,envel%(5),envel%(6),envel%(7),e
nvel%(8),envel%(9),envel%(10),en
vel%(11),envel%(12)
6200PROC_CURSOR(count)
6210ENDPROC
6400DEFPROC_inc(dir)
6410IFenvel%(pos)+dir<min(pos)O
Renvel%(pos)+dir>max(pos)THENEND
PROC
6420envel%(pos)=envel%(pos)+dir
6430IFpos>0THENPROC_bar(pos)
6440IFposMOD2=0THENx=300ELSEx=9
20
6450y=294-((pos/2)MOD7)*48
6460VDU18,0,128,24,x;y;x+256;y+
32;16,26,18,0,1
6470PLOT4,x,y+32:PRINTSTR$(enve
l%(pos))
6480ENDPROC
6500DEFPROC_sound
6510ENVELOPE4,envel%(0),envel%(
1),envel%(2),envel%(3),envel%(4)
,envel%(5),envel%(6),envel%(7),e
nvel%(8),envel%(9),envel%(10),en
vel%(11),envel%(12)
6520SOUND1,4,128,10
6530SOUND1,4,64,10
6540SOUND1,4,192,10
6550ENDPROC
6560DEFPROC_hlt
6570IFposMOD2=0THENx=0ELSEx=620
6580y=294-((pos/2)MOD7)*48
6590VDU18,3,130,24,x;y;x+192;y+
32;16,18,0,127,26
6600ENDPROC
6700DEFPROC_bar(pos)
6710IFpos<4THENoff=pos-1:x=40
6720IFpos>3ANDpos<7THENoff=pos-
4:x=340
6730IFpos>6ANDpos<11THENoff=pos
-7:x=640
6740IFpos>10THENoff=pos-11:x=10
00
6750VDU18,0,128,24,x+off*60;400
;x+40+off*60;788;16,18,0,130,
6760heit=526+envel%(pos)
6770IFheit>525THENVDU24,x+off*6
0;526;x+40+off*60;heit;16,
6780IFheit<526THENVDU24,x+off*6
0;heit;x+40+off*60;526;16,
6790GCOL0,128
6800ENDPROC
6900DEFPROC_move(dir)
6910IFpos+dir<0ORpos+dir>12THEN
ENDPROC
6920PROC_hlt:pos=pos+dir:PROC_h
lt
6930ENDPROC
20000DATA 101,109,117,121,129,13
7,145,149,157,165,169,177
20010DATA 5,7,10,15,20,30,40,60
20012DATA 0,-128,-128,-128,0,0,0
,-127,-127,-127,-127,0,0
20014DATA 255,127,127,127,255,25
5,255,127,127,0,0,126,126
20020DATA TIM,PI1,PI2,PI3,PN1,PN
2,PN3,AA,AD,AS,AR,ALA,ALD
>
```

■

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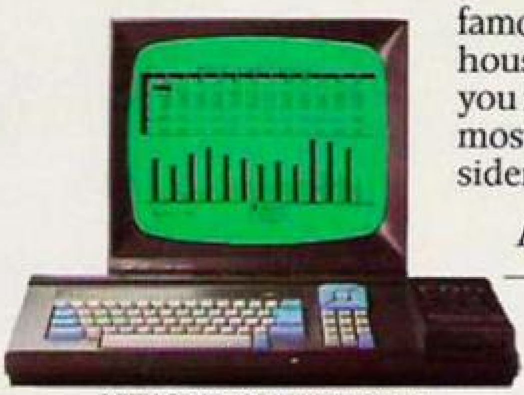
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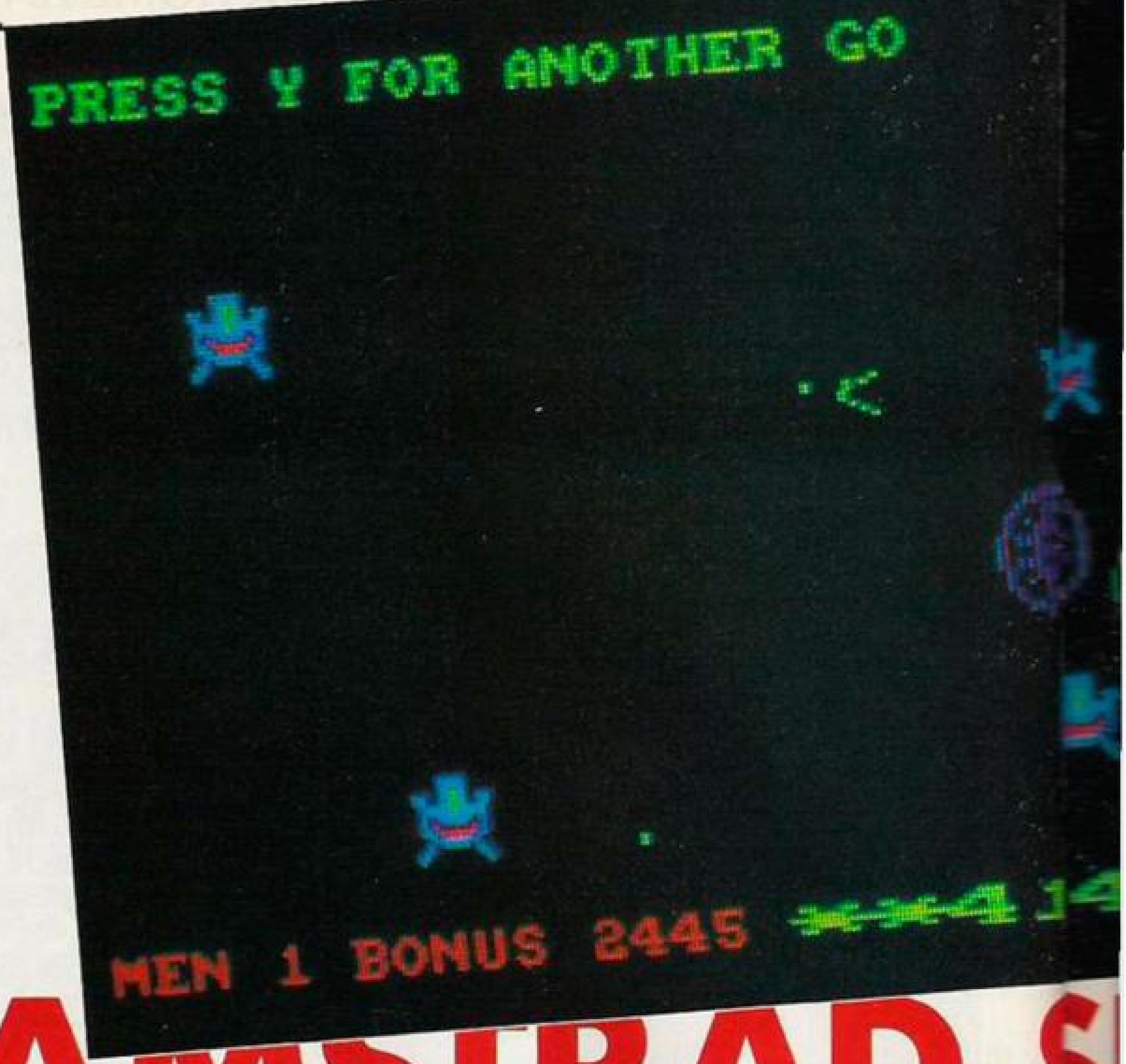
HERE'S A colourful asteroids-style game for the Amstrad CPC-464. While using Mode 1 it manages to give a whole range of colours and provides Mode 0 size text printing on the screen using a Rom indirection. Get yourself a high score by shooting the eggs and aliens but watch the bonus. Quick shots will score well but be slow and the bonus will turn against you!

The game features 44 sprites of different sizes with up to 25 on the screen at any one time. These are controlled by a machine-code routine that can easily be adapted for your own purposes. In fact, most of the action is controlled by machine-code making the main Basic game loop very short and speedy.

The main program appears in listing 1 and may be typed in directly. It should be saved — with Goto 20000 — before running as any mistakes in the data may cause the system to crash. The machine-code is in five routines, three of which are listed so that you can used them in your own programs. The first one — listing 2 — is for wide printing mimicking mode 0 printing.

In fact, it will work in any mode with suitable changes to the final few bytes to reset the cursor position. It works by altering the high byte of the Rom indirection at &BDD5 using Poke so that instead of pointing to the Rom routine at &134A, it points to our routine at &A34A.

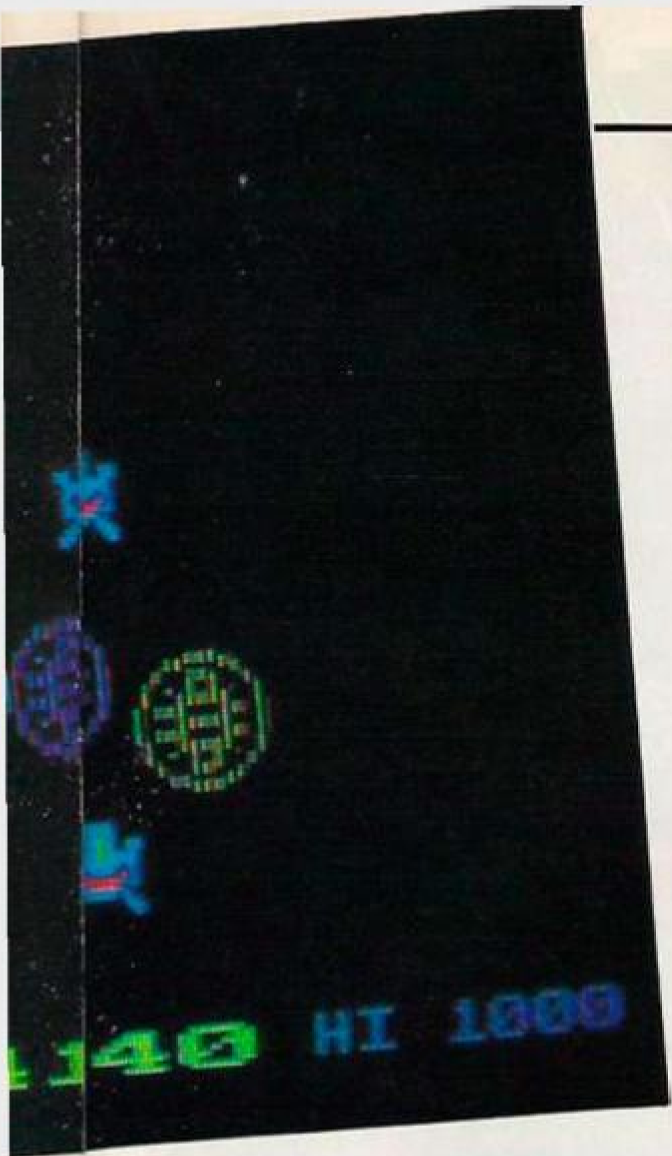
We can then use the usual Print command including the Print Using format. The colour of the printing is given by the pen mask — changing this can give striped writing or mixed colours. Note that the indirection supplies the screen position as a physical



AMSTRAD S

Listing 1.

```
10 REM ********************************
20 REM *          SPACE EGGS          *
30 REM *              by              *
40 REM *      Christopher Leigh       *
50 REM ********************************
100 GOTO 3000
200 LOCATE 12,25:PRINT b%:LOCATE 18,25:POKE &BDD5,&A3:
PRINT USING "######";score:POKE &BDD5,&13:RETURN
1000 REM ** main loop **
1010 IF INKEY(27)=0 THEN head=(head+1)AND 7:|ERASE,&A5
00:POKE &A506,17*head+&65:POKE &A500,1
1020 IF INKEY(35)=0 THEN head=(head-1)AND 7:|ERASE,&A5
00:POKE &A506,17*head+&65:POKE &A500,1
1030 g%=(head=5 OR head=6 OR head=7)-(head=1 OR head=2
 OR head=3):h%=(head=3 OR head=4 OR head=5)-(head=7 OR
 head=0 OR head=1)
1040 IF INKEY(60)=0 THEN POKE &A503,(PEEK(&A503)+h%)AN
D 255:POKE &A504,(PEEK(&A504)+g%)AND 255
1050 IF INKEY(47)=0 THEN SOUND 130,10,10,15,1,1:CALL &
A083,g%,h%
1060 IF INKEY(63)=0 THEN FOR N=50 TO 10 STEP-2:SOUND 1
30,n,5,15,1,1:NEXT:|ERASE,&A500:POKE &A500,1:POKE &A50
1,RND*79:POKE &A502,RND*47
1070 FOR n=0 TO p%:NEXT:|MOVE:b%=b%-5:CALL &A700,@a%:I
F a%=0 THEN 1010 ELSE IF a%=4 THEN 2000
1080 IF a%=3 THEN SOUND 133,800,150,15,2,1:score=score
+20:GOTO 1010
1090 IF a%=2 THEN SOUND 133,10,100,15,2,1:score=score+
50:GOTO 1010
1100 IF a%=1 THEN SOUND 133,10,150,15,2,2,30:score=sco
re+100:e%=e%-1:IF e%<>0 THEN 1010 ELSE score=score+b%:
POKE &A503,RND*3:POKE &A504,RND*3:GOTO 4000
2000 REM ** lives **
2010 BORDER 26:SOUND 135,100,150,15,2,2,15:FOR n=0 TO
10:NEXT:BORDER 0
2020 men=men-1:IF men>0 THEN DI:LOCATE 1,25:PRINT "MEN
";men:EI:|ERASE,&A500:POKE &A500,1:POKE &A501,39:POKE
&A502,24:GOTO 1000
2030 IF score>hi THEN hi=score
2040 POKE &A501,39:POKE &A502,24:POKE &A503,0:POKE &A5
04,0:POKE &A506,&65
2050 DI:PEN 3:LOCATE 1,5:PRINT "PRESS Y FOR ANOTHER GO
":PEN 2:EI
2060 IF INKEY(43)<>0 THEN 2060 ELSE head=0:men=3:score
=0:GOTO 4000
3000 REM ** start game **
3010 MODE 1:BORDER 1:INK 3,24:INK 2,21:INK 1,16:INK 0,
1:MEMORY &A2FF
3020 FOR n=&A34A TO &A37F:READ a$:POKE n,VAL("&"+a$):N
EXT
3030 DATA e5,f5,cd,1a,bc,f1,eb,cd,a5,bb,06,07,4e,c5,d5
,06,04,af,cb,21,30,02,f6,cc,cb,21,30,02,f6,33,12,13,10
,ef,d1,e5,21,00,00,19,eb,e1,23,c1,10,de,e1,24,24,24,2c
,c3,75,b0
3040 PEN 3:LOCATE 2,2:POKE &BDD5,&A3:PRINT "SPACE EGGS
 ";:POKE &BDD5,&13:PRINT "by C.J.Leigh"
3050 PEN 2:PRINT:PRINT " Due to a fault in your hyper
space     generator you find yourself in an        unch
arted region of space.  Suddenly allyour emergency sys
tems go wild and your sights are filled with strange e
gg like"
3060 PRINT "creatures.  Madly you fire your laser    ca
non but hitting an egg merely releasestwo aliens and h
itting them produces     even more seed eggs.  And all
the time  the void is filled with alien screams."
3070 PRINT "If you are not quick enough they will   ge
t you and then you will scream as the madness takes ov
er."
3080 GOSUB 10000
3090 PEN 1:LOCATE 1,20:PRINT "  Use I & P for rotate l
eft and right;         S for subspace thrusters;
        X for hyperspace jump
Space for fire"
3100 IF INKEY$<>"" THEN 3100
3110 IF INKEY$="" THEN 3110
3120 a%=0:head=0:hi=1000:men=3:score=0
3130 ENV 1,15,-1,1:ENT -1,15,10,1,15,-10,1:ENV 2,15,-1
,10:ENT 2,15,10,10
3140 EVERY 50,2 GOSUB 200
4000 REM ** new screen **
4010 BORDER 0:INK 0,0:INK 1,11:INK 2,6:INK 3,18:MODE 1
:b%=3000:e%=16:POKE &A002,0:IF score>4000 THEN p%=0 EL
SE p%=40
4020 DI:LOCATE 1,25:PEN 2:PRINT "MEN";men;"BONUS";b%:L
OCATE 18,25:POKE &BDD5,&A3:PRINT USING "######";score;
:POKE &BDD5,&13:PEN 1:PRINT " HI";hi:PEN 2:EI
4030 FOR n=100 TO 800 STEP 20:SOUND 7,n,10,15:NEXT
4040 FOR n=1 TO 8:POKE &A500+n*9,0:NEXT
4050 FOR n=9 TO 12:POKE &A500+n*9,1:NEXT
4060 FOR n=13 TO 36:POKE &A500+n*9,0:NEXT
4070 GOTO 1000
10000 REM ** machine code **
10010 FOR n=&A400 TO &A80F:READ a$:POKE n,VAL("&"+a$)
10020 NEXT:CALL &A400:RETURN
10030 DATA 01,0e,a4,21,0a,a4,cd,d1,bc,c9,00,00,00,00,1
6,a4,c3,ec,a4,c3,20,a4,45,52,41,53,c5,4d,4f,56,c5,00
10040 DATA dd,21,00,a5,10,49,21,ca,a4,36,00,dd,7e,01,0
0,00,00,cd,79,a4,21,ca,a4,dd,7e,05,77,dd,7e,02,dd,86,0
4,f2,46,a4,c6,30,fe,30,30,02,d6,30,dd,77,02
10050 DATA dd,7e,01,dd,86,03,f2,5a,a4,c6,50,fe,50,38,0
2,d6,50,dd,77,01,dd,36,00,00,cd,79,a4,11,09,00,dd,19,d
d,7e,00,1f,38,b1,1f,30,f2,c9
10060 DATA f5,d6,50,ed,44,4f,dd,66,02,dd,5e,06,dd,56,0
7,1a,47,af,13,f1
10070 DATA e5,f5,d5,11,00,00,f5,7c,fe,30,38,02,d6,30,c
b,3f,30,02,16,20,6f,26,00,f1,d5,29,29,29,29,e5,d1,29,2
9,19,d1,19,16,c0,5f,19,d1
10080 DATA 3e,04,f5,c5,e5,1a,fe,00,28,0c,7e,fe,00,20,0
3,dd,77,00,1a,a6,f6,77,13,23,0d,20,00,d5,af,11,50,00,e
d,52,d1,10,e0
10090 DATA e1,01,00,00,09,c1,f1,3d,20,d3,f1,e1,24,2d,2
0,a2,c9
10100 DATA d5,21,ca,a4,36,00,dd,e1,dd,36,00,00,dd,7e,0
1,c3,79,a4,00,00
11000 REM ** move data **
11010 ' spaceship & bullets
11020 DATA 01,27,10,00,00,ff,65,a6,00
11030 DATA 00,00,00,00,00,ff,60,a6,00,00,00,00,00,00,f
f,60,a6,00
11040 DATA 00,00,00,00,00,ff,60,a6,00,00,00,00,00,00,f
f,60,a6,00
11050 DATA 00,00,00,00,00,ff,60,a6,00,00,00,00,00,00,f
f,60,a6,00
11060 DATA 00,00,00,00,00,ff,60,a6,00,00,00,00,00,00,f
f,60,a6,00
11070 ' asteroids
11080 DATA 01,1f,0f,01,01,a5,ed,a6,00,01,31,0f,ff,01,f
a,ed,a6,00
11090 DATA 01,30,20,01,00,af,ed,a6,00,01,31,21,00,ff,d
7,ed,a6,00
11100 DATA 00,00,00,01,ff,ff,7e,a7,00,00,00,00,ff,ff,f
f,7e,a7,00
11110 DATA 00,00,00,00,ff,ff,7e,a7,00,00,00,00,ff,00,f
f,7e,a7,00
11120 DATA 00,00,00,ff,01,ff,7e,a7,00,00,00,00,01,ff,f
f,7e,a7,00
11130 DATA 00,00,00,00,01,ff,7e,a7,00,00,00,00,01,00,f
f,7e,a7,00
11140 DATA 00,00,00,fe,fe,0f,bf,a7,00,00,00,00,02,fe,f
0,bf,a7,00
11150 DATA 00,00,00,fe,00,a5,bf,a7,00,00,00,00,00,02,a
5,bf,a7,00
11160 DATA 00,00,00,02,02,ff,bf,a7,00,00,00,00,fe,02,f
f,bf,a7,00
11170 DATA 00,00,00,02,00,f5,bf,a7,00,00,00,00,00,fe,5
f,bf,a7,00
11180 DATA 00,00,00,fe,fe,5f,bf,a7,00,00,00,00,02,fe,f
5,bf,a7,00
11190 DATA 00,00,00,fe,00,a0,bf,a7,00,00,00,00,00,02,a
a,bf,a7,00
11200 DATA 00,00,00,02,02,a5,bf,a7,00,00,00,00,fe,02,a
a,bf,a7,00
11210 DATA 00,00,00,02,00,f0,bf,a7,00,00,00,00,00,fe,0
f,bf,a7,00
11220 ' extra
11230 DATA 02,00,09,01,00,ff,11,a0,00,00,00,0a,21,01,f
f,16,a0,00
11240 DATA 02
12000 REM ** shape data **
12010 ' bullet & spaceship
12020 DATA 01,00,66,66,00
12030 DATA 02,cc,00,33,00,00,cc,00,33,00,33,00,cc,33,0
0,cc,00
12040 DATA 02,00,00,00,00,00,44,00,44,cc,22,33,22,00,f
f,00,33
12050 DATA 02,00,11,00,11,44,22,44,22,22,44,22,44,11,0
0,11,00
12060 DATA 02,11,00,11,00,22,00,22,00,44,33,44,cc,ff,0
0,cc,00
12070 DATA 02,00,33,00,cc,33,00,cc,00,cc,00,33,00,00,c
c,00,33
12080 DATA 02,cc,00,ff,00,44,cc,44,33,22,00,22,00,11,0
0,11,00
12090 DATA 02,11,00,11,00,22,44,22,44,44,22,44,22,00,1
1,00,11
12100 DATA 02,00,33,00,ff,33,22,cc,22,00,44,00,44,00,0
0,00,00
12110 ' asteroids
12120 DATA 06,00,00,77,ee,00,00,00,33,ff,ff,cc,00,00,7
7,00,11,ee,00
12130 DATA 00,cc,33,cc,33,00,11,00,77,ee,11,00,33,00,6
6,66,00,cc
12140 DATA 66,22,66,66,44,66,66,11,ff,ff,00,66,66,11,f
f,ff,00,66
12150 DATA cc,ff,00,11,ff,33,cc,ff,00,11,ff,33,cc,11,f
f,ff,00,33
12160 DATA cc,11,ff,ff,00,33,cc,ff,00,11,ff,33,cc,ff,0
0,11,ff,33
12170 DATA 66,11,ff,ff,00,66,66,11,ff,ff,00,66,66,22,6
6,66,44,66
12180 DATA 33,00,66,66,00,cc,11,00,77,ee,11,00,00,cc,3
3,cc,33,00
12190 DATA 00,77,00,11,ee,00,00,33,ff,ff,cc,00,00,00,7
7,ee,00,00
12200 DATA 04,00,70,e0,00,00,70,e0,00,00,71,e0,00,e0,7
1,e0,70
12210 DATA e0,71,e0,70,70,f1,f0,e0,70,f1,f0,e0,61,f0,f
0,60
12220 DATA 61,70,e1,60,70,0f,0f,e0,70,07,1e,e0,10,f0,f
0,00
12230 DATA 30,70,e0,c0,70,00,00,e0,e0,00,00,70,c0,00,0
0,30
12240 DATA 02,33,cc,77,ee,ff,ff,ff,ff,ff,ff,ff,ff,77,e
e,33,cc
13000 REM ** check collision **
13010 DATA af,21,ca,a4,77,eb,77,dd,21,00,a5,11,09,00,0
e,04,dd,be,00,20,07,71,c9,dd,19,06,24,af,dd,be,00,20,1
e,3a,01,a5,dd,be,01,20,06,3c,dd,be,01,20,10,3a,02,a5,d
d,be,02,20,06,3c,dd,be,02,20,02,71,c9,dd,19,10,d0
13020 DATA dd,21,09,a5,06,00,af,dd,be,00,c4,70,a0,dd,1
9,10,f5
13030 DATA fd,21,75,a5,0d,06,04,3e,66,cd,49,a0,06,00,0
d,cd,49,a0,06,10,03,3e,66,dd,be,00,20,04,71,c3,70,a0,d
d,19,10,f1,c9
13040 DATA dd,be,00,20,21,71,00,cd,70,a0,fd,36,00,01,f
d,36,09,01,dd,7e,01,fd,77,01,fd,77,0a,dd,7e,02,fd,77,0
2,fd,77,0b,f1,c9,fd,19,fd,19,dd,19,10,d2,c9
13050 DATA c5,d5,e5,cd,f4,a4,e1,d1,c1,c9
13060 REM ** fire bullets **
13070 DATA 00,dd,4e,00,dd,46,02,c5,3a,02,a0,c6,09,fe,4
0,38,01,af,32,02,a0,c6,09,5f,16,a5,d5,cd,ec,a4,e1,36,0
1,eb,13,c1,cb,20,cb,21,21,01,a5,7e,01,12,13,23,7e,00,1
2,13,23,7e,01,12,13,23,7e,00,12,c9
20000 SPEED WRITE 1:SAVE "space eggs"
20010 SPEED WRITE 0:SAVE "!space eggs"
20020 PRINT CHR$(7)"Rewind the tape":CAT
```





Christopher Leigh presents a new version of a favourite shoot-'em-up using sprites in glorious colour.

SPACE EGGS

position — top left = 0, 0 — whilst the cursor must be reset to the logical position — top left = 1, 1 — hence the extra increment instructions.

The second and third routines control the sprites and are called using Resident System Extension (RSX) commands. Move and Erase must be preceded by the elongated colon — shift @ — and 1Erase must be followed by a comma and its parameter which is the address of the first byte of the move data for the sprite.

The screen is 80 bytes wide and the sprite routines divide it into 50 half lines high, so that each sprite unit is a quarter of a Mode 1 character. These routines can cope with sprites of any size and — with slight alterations — of any shape. All our sprites will be set in a square sprite shape definition, but since zero bytes are not written to the screen — making the sprite transparent — the sprite can be any shape within that framework.

As written the procedure allows full wrap-around, adjusting for sprites being partly off a screen edge. Again fairly simple alterations will allow sprites to bounce.

1Erase simply erases a sprite and turns it off. 1Move works by calculating the old sprite position and then writing it with an ink mask of zero to rub it out, then calculating the new position and writing with the ink mask given in the move data.

This ink mask can be set to produce pure colours or colour mixtures for a whole sprite. The new position is calculated by adding the speed components to the old position and then ensuring it is on the screen. The move data also includes the address of the shape data for a particular sprite and a collision byte. This collision byte is the last non zero byte read off the screen when writing the sprite. This allows us to know if it is on top of anything and also what it is n top of.

The move data consists of nine bytes formatted thus: on/off flag, right position, down position, right speed, down speed, ink mask, shape address low, shape address high, collision byte. 1Move will, in fact, move every sprite, whose on/off flag is one, in the block of move data and the routine is stopped by a value of two. The shape data address can be altered to change the shape of a sprite during the game as is done to rotate your space ship.

The first byte of the shape data is the size of the sprite in quarters. The rest of the shape data comprises bytes made up in the same way as characters are plotted on the screen in Mode 1.

As already suggested, 1Move only needs to be called once a game cycle to move everything. Printing of score and bonus is done once a second by calling the routine at line 200. All that remains is to read the keys, produce sound effects, check for collisions and keep the bullets firing.

For the sake of speed the last two requirements are covered by two routines tailored for this game. Collision checking is done by reading the collision flags of each sprite and by checking for identical positioning. The latter is only needed for a stationary sprite.

Eight bullets are allowed on screen at any time so as each is fired the one eight back must be erased. Key checking is left in Basic so that you can easily change the program to suit your fingers, and the speed can be changed using p% in 1070 and 4010.

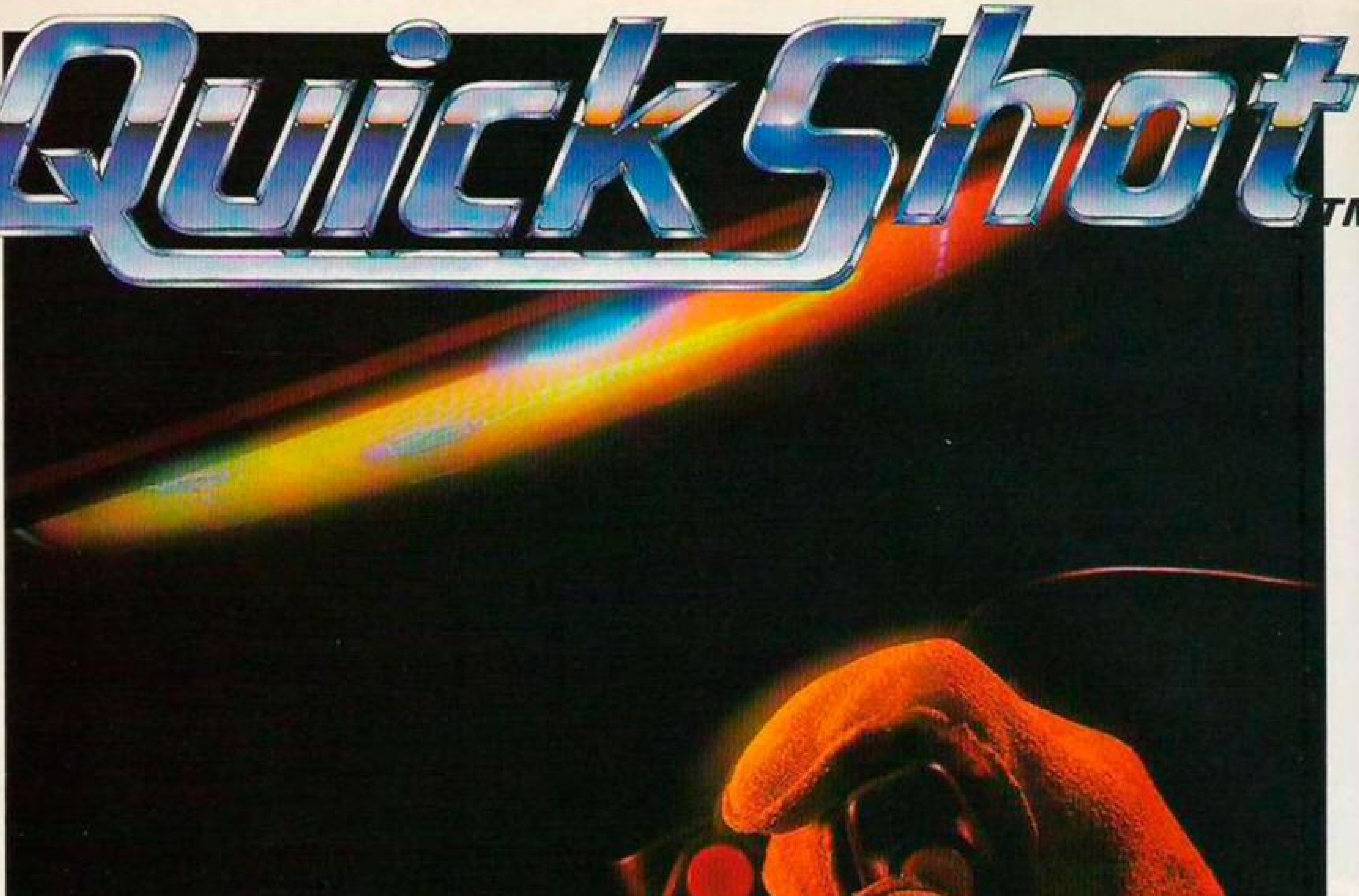
Note that your subspace thrusters always work in the direction you are pointing so that once moving you need to turn round in order to slow down. Remember your hyper space dive is kaput so using it could well land you in the middle of one of those eggs or in the firing line of your own bullets. The faster you shoot the aliens the larger the bonus — if you take too long your bonus will become negative having a disastrous effect on your score!

Should you wish to start firing immediately without typing in the lengthy data, you should send £3 for a tape to C.J. Leigh, 12 The Bassetts, Cashes Green, Stroud, Glos GL5 4SJ. Ask for Space Eggs and don't forget your name and address.

Listing 2.

```
                 ORIGIN  A34A
E5               PUSH HL        ;save cursor position
F5               PUSH AF        ;save character code
CD1ABC           CALL BC1A      ;SCR_CHAR_POSITION
F1               POP AF
EB               EX DE,HL       ;screen address in DE
CDA5BB           CALL BBA5      ;TXT_GET_MATRIX
0607             LD B,07        ;only top 7 rows
4E       CHRROW  LD C,(HL)      ;character byte
C5               PUSH BC
D5               PUSH DE
0604             LD B,04        ;stretch to 4 bytes
AF       BYTE    XOR A
CB21             SLA C          ;first pixel
3002             JRNC 02        ;pixel to screen byte
F6CC             OR A,CC        ;mask pen 3
CB21             SLA C          ;next pixel
```

(continued on page 67)





Shoot to win!

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(continued from page 65)

```
3002          JRNC 02
F633          OR A,33          ;other half of byte
12            LD (DE),A        ;byte to screen
13            INC DE           ;next screen address
10EF          DJNZ BYTE        ;back for next pixel
D1            POP DE           ;screen address
E5            PUSH HL          ;save matrix address
210008        LD HL,800
19            ADD HL,DE        ;next screen row
EB            EX DE,HL         ;back in DE
E1            POP HL
23            INC HL           ;next character byte
C1            POP BC           ;recover row count
10DE          DJNZ CHRROW      ;next character row
E1            POP HL           ;recover cursor position
24            INC H
24            INC H
24            INC H
2C            INC L            ;reposition cursor
C375BB        JP BB75          ;TXT_SET_CURSOR
```

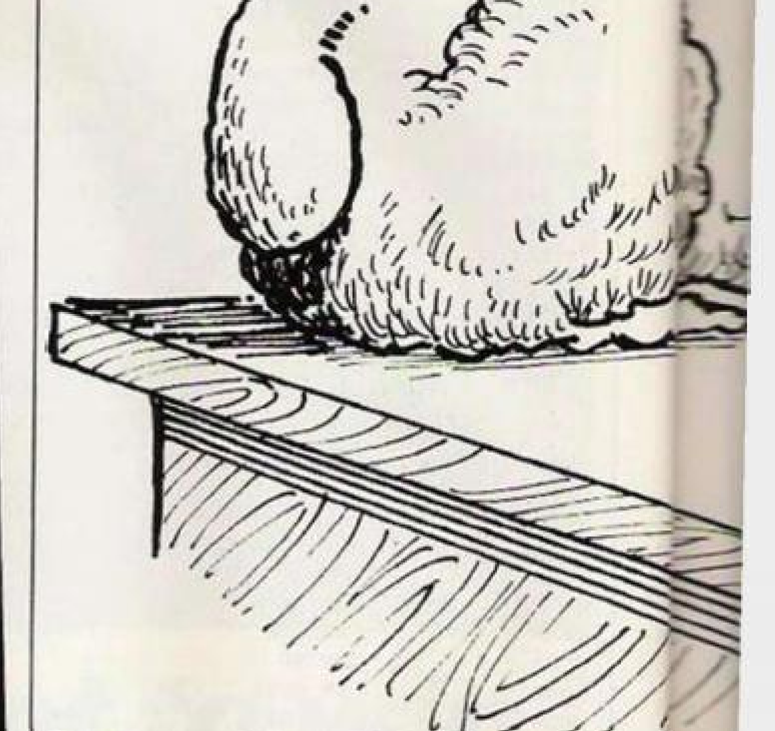
Listing 3.

```
                  ORIGIN A400
010EA4   LOGON    LD BC,JMPTAB       ;set up new commands
210AA4            LD HL,BUFFER       ;system workspace
CDD1BC            CALL BCD1          ;KL_LOG_EXT
C9                RET
00000000 BUFFER   DEFS 4
16A4     JMPTAB   DEFW NMETAB        ;command names address
C3ECA4            JP ERASE
C320A4            JP MOVE
4D524153          DEFM 'ERAS'
C5                DEFB 'E'+80
4D4F56            DEFM 'MOV'
C5                DEFB 'E'+80
00                NOP                ;end marker
DD2100A5 MOVE     LD IX,A500
1849              JR CHKEND
21CAA4   NEXSPR   LD HL,MASK+1
3600              LD (HL),0
DD7E01            LD A,(IX+1)        ;right position
000000            DEFS 3             ;for MC_WAIT_FLYBACK
CD79A4            CALL WRISPR        ;erase old sprite
21CAA4            LD HL,MASK+1
DD7E05            LD A,(IX+5)        ;sprite mask
77                LD (HL),A
DD7E02            LD A,(IX+2)        ;down position
DD8604            ADD A,(IX+4)       ;down speed
F246A4            JP P,02
C630              ADD 30             ;ensure positive
FE30              CP 30
3802              JR C,02
D630              SUB 30             ;not too large
DD7702            LD (IX+2),A        ;new down position
DD7E01            LD A,(IX+1)        ;right position
DD8603            ADD A,(IX+3)       ;right speed
F25AA4            JP P,02
C650              ADD 50             ;ensure positive
FE50              CP 50
3802              JR C,02
D650              SUB 50             ;not too large
DD7701            LD (IX+1),A        ;new right position
DD360800          LD (IX+8),00       ;clear collision flag
CD79A4            CALL WRISPR        ;write new sprite
110900   MOVEON   LD DE,09
DD19              ADD IX,DE          ;check next sprite
DD7E00   CHKEND   LD A,(IX+0)
1F                RRA                ;sprite on?
38B1              JR C,NEXSPR
1F                RRA                ;no more sprites?
30F2              JR NC,MOVEON
C9                RET
F5       WRISPR   PUSH AF            ;save right position
D650              SUB 50
ED44              NEG
4F                LD C,A             ;room for sprite
DD6602            LD H,(IX+2)        ;down position
DD5E06            LD E,(IX+6)        ;shape data address
DD5607            LD D,(IX+7)        ;shape high byte
1A                LD A,(DE)          ;size of sprite
47                LD B,A             ;width
6F                LD L,A             ;height
13                INC DE
F1                POP AF             ;right position
E5       VERT     PUSH HL
F5                PUSH AF
D5                PUSH DE
110000            LD DE,0000
F5                PUSH AF
7C                LD A,H             ;down position
FE30              CP 30              ;off screen bottom?
3802              JR C,02
D630              SUB 30
CB3F              SRL A              ;divide by two
3002              JR NC,02
1620              LD,20              ;middle of line
6F                LD L,A
2600              LD H,00            ;prepare to multiply
F1                POP AF
D5                PUSH DE
29                ADD HL,HL          ;times two
29                ADD HL,HL
29                ADD HL,HL
29                ADD HL,HL
E5                PUSH HL            ;sixteen times
D1                POP DE
29                ADD HL,HL
29                ADD HL,HL          ;times sixty four
19                ADD HL,DE          ;times eighty
D1                POP DE             ;half line offset
19                ADD HL,DE
16C0              LD D,C0            ;start of screen
5F                LD E,A             ;right position
19                ADD HL,DE          ;screen address
D1                POP DE             ;data address
3E04              LD A,04            ;four lines a block
F5       LINE     PUSH AF
C5                PUSH BC            ;width parameters
E5                PUSH HL
1A       BYTE     LD A,(DE)
FE00              CP 00
280C              JR Z,ZERO          ;ignore zero bytes
7E                LD A,(HL)          ;screen byte
FE00              CP 00              ;check collision
2803              JR Z,03
DD7708            LD (IX+8),A        ;collision flag
1A                LD A,(DE)          ;sprite byte
E6FF     MASK     AND FF             ;pen mask
77                LD (HL),A          ;write screen
13       ZERO     INC DE             ;next data
23                INC HL             ;next screen byte
0D                DEC C
2008              JR NZ,ROOM         ;room for sprite
D5                PUSH DE
AF                XOR A
115000            LD DE,0050
ED52              SBC HL,DE          ;start of line
D1                POP DE
10E0     ROOM     DJNZ BYTE          ;next width byte
E1                POP HL
010008            LD BC,0800
09                ADD HL,BC          ;next screen line
C1                POP BC
F1                POP AF
3D                DEC A              ;four lines
20D3              JRNZ,LINE
F1                POP AF
E1                POP HL
24                INC H
2D                DEC L
20A2              JRNZ,VERT          ;next vertical block
C9                RET
D5       ERASE    PUSH DE            ;data base address
21CAA4            LD HL,MASK+1
3600              LD (HL),00         ;clear pen mask
DDE1              POP IX
DD360000          LD (IX+0),00       ;turn sprite off
DD7E01            LD A,(IX+1)
C379A4            JP WRISPR
```

```
1 REM ************************
2 REM *   SPECTRUM RAMDISK    *
3 REM ************************
4 REM Acknowledgements to Ric
hard Taylor YC March 1985 for th
e
5 REM method of redefining ba
sic words.
100 DATA "ff8df8f3ed4bb45ced5b3
85c2a7b5cd93e00d3fe3e3fed472ab2"
110 DATA "5c545d36002bbc20fad9e
d43b45ced53385c227b5cd9ed53b25c"
120 DATA "21003c22365ceb363e2bf
92b2b223d5c21b65c224f5c11af1501"
130 DATA "1500ebedb0eb2b22575c2
322535c224b5c36802322595c360d23"
140 DATA "36802322615c22635c226
55c3e07328d5c328f5c32485c212305"
150 DATA "22095cfd35c6fd35ca21c
61511105c010e00edb0fdcb01cecddf"
160 DATA "0efd363102fbcd6b0daf1
11ff9cd0a0cfdcb02ee18198052414d"
170 DATA "444f53207f20526f20313
938358dfd363102cd9517cdb016afcd"
180 DATA "0116cd2c0fcd94fafdcb0
07e202cfe5c20163a3a5cfe0b200f21"
190 DATA "45f9e521ddfae5fd3600f
fc37dfbfdcb306628402a595ccda711"
200 DATA "fd3600ff18c42a595c225
d5ccdfb1978b1c242fadffe0d28a7fd"
210 DATA "cb3046c4af0dcd6e0d3e1
9fd964f328c5cfdcb01fefd3600fffd"
220 DATA "360a01cdf0fa76fdcb01a
efdcb304ec4cd0e3a3a5c3cf5210000"
230 DATA "fd363702fd7426220b5c2
322165ccdb016fdcb37aecd6e0dfdcb"
240 DATA "02eef147fe0a3802c607c
def153e20d778119113cd0a0caf1136"
250 DATA "15cd0a0ced4b455ccd1b1
a3e3ad7fd4e0d0600cd1b1acd97103a"
260 DATA "3a5c3c281dfe092804fe1
52003fd340d01030011705c21445cfd"
270 DATA "cb0a7e280109edb8fd360
afffdcb019ec33bf93e10010000c3bb"
280 DATA "f9ed43495c2a5d5ceb213
afae52a615c37ed52e56069cd6e1920"
290 DATA "06cdb819cde819c1793db
02828c5030303032bed5b535cd5cd55"
300 DATA "16e122535cc1c5132a615
c2b2bedb82a495cebc1702b712b732b"
310 DATA "72f1c331f9fdcb01becdf
b19affd770d3dfd77001801e7cdbf16"
320 DATA "fd340dfa8a1cdf0600fe0
d2864fe3a28eb21ddfae54fe779fefa"
330 DATA "ca62fbfeeaca19fbfee6c
a70f8fefdca2efffe2ac2441bc37dfb"
340 DATA "cd541fd27b1bfdcb0a7e2
06c2a425ccb7c281421feff22455c2a"
350 DATA "615c2bed5b595c1b3a445
c1834cd6e19fd7e0a281aa7c2ec1b47"
360 DATA "7ee6c078280fcfffc1cd3
025c82a555c3ec0a6c0affe01ce0056"
370 DATA "235eed53455c235e2356e
b192322555ceb225d5c571e00fd360a"
380 DATA "ff15fd720dcaa5fa14cd8
b192802cf16dffe0d28c0fe3acaa5fa"
390 DATA "c38a1ccd821cdffecbc28
a1cc1cd30252809ef0238ebcde93438"
400 DATA "a0c3a5fadf0600fe73286
4fe6c285ffe6d2859fe642854fe7428"
410 DATA "4ffe632835fe78ca10fff
e66ca5dfdfe65281cc38a1c00000000"
420 DATA "000000000000000000000
0000000000000000000000e7cdee1b21"
430 DATA "6df8226ef8c9fd363a06e
7cdee1bcd3025c8011300f7d5dde1c3"
440 DATA "11fd0404040404fd703ae
7cd8c1ccd30252834012400f7d5dde1"
450 DATA "060b3e20121310fcdd360
1ffcdf12b21f6ff0b0903300ffd7e3a"
460 DATA "a72002cf0e78b1280a010
a00dde5e123ebedb0fd7e3afe052021"
470 DATA "dfcdee1bed5b6ef8dd730
ddd720e214effaffd773aed52dd750b"
480 DATA "dd740cebc31007dffeaa2
01ffd7e3afe03ca8a1ce7cdee1bdd36"
490 DATA "0b00dd360c1b210040dd7
50ddd740e184dfeaf204ffd7e3afe03"
500 DATA "ca8a1ce7cd4820200cfd7
e3aa7ca8a1ccde61c180fcd821cdffe"
510 DATA "2c200cfd7e3aa7ca8a1cc
de61c1804e7cd821ccdee1bcd991edd"
520 DATA "710bdd700ccd991edd710
ddd700e6069dd3600031844feca2809"
530 DATA "cdee1bdd360e801817fd7
e3aa7c28a1ce7cd821ccdee1bcd991e"
540 DATA "dd710ddd700edd3600002
a595ced5b535c37ed52dd750bdd740c"
550 DATA "2a4b5ced52dd750fdd741
0ebe5011100dd092a6ef8011100dde5"
560 DATA "d1edb0dd7511dd7412fd7
e3afe0620583efecd0116dd7e00fe04"
570 DATA "383a3e0dd72a6ef8ed4bb
25caff5ed42444dcd2b2dcde32d1151"
580 DATA "fdc3220c2042797465732
0667265658de7cdee1b3e02cd0116cd"
590 DATA "1a1f21ffff3f18d011c00
9cd0a0cdde5d1060a131ad710fb1837"
600 DATA "0e80dd7e00ddbeef20020
ef6fe04380afd7e3aa7ca94fee1cf07"
610 DATA "dde5d121f0ff19060a7e3
c200379804f131abe2320010c10f7cb"
620 DATA "792810dd460cdd4e0bdd6
e11dd661209c314fdfd7e3aa720272a"
630 DATA "6ef8dd5e0bdd560c19dd5
efadd56fb7ab32811ed52ed5bb25ced"
640 DATA "52dab1fecde4fec394fee
1c9e147fe04cae4fedd7e00fe032808"
650 DATA "783dca32fec3ccfee5dd6
efadd66fbdd5e0bdd560c7cb5e17cb5"
660 DATA "2006dd6e0ddd660e424b5
45ddd6e11dd6612edb0c9dd5e0bdd56"
670 DATA "0ce5dd6efadd66fbeb37e
d5238291105001944dcd051fe1eb2a"
680 DATA "595c2bdd225f5cdd4e0bd
d460cc5cde519c1e5c5cd5516dd2a5f"
690 DATA "5c23dd4e0fdd461009224
b5cdd660e7ce6c0200add6e0d22425c"
700 DATA "fd360a00c1dd6e11dd661
2d1edb0c92a6ef8dd5efadd56fb7ab3"
710 DATA "caf3fded52011100ed42e
d5bb25ced523002cf0319ebdde5e137"
720 DATA "ed4223ed536ef8edb0dd4
efadd46fbe1edb0c9dd4e0bdd460cc5"
730 DATA "03f73680c1d5dd6e11dd6
612edb0c3cd08dd5e11dd56121bdd6e"
740 DATA "0bdd660c19e5eb011100a
7ed42ed5b6ef8e52323ed52444de1d1"
750 DATA "edb81313ed536ef8c9cd7
91ccdee1bcd991e036069cd6e19e5cd"
760 DATA "991e6069cd6e19d1ebcde
519c9dfcdde1ccdee1bcd991e78b120"
770 DATA "04ed4bb25c2a6ef8a7ed4
2dab1fec3b71ec9000000000000000"
800 DATA 43367,45632,26003,2409
7,23479,45337,35906,39309,30286,
44616
802 DATA 50490,49745,36529,4480
4,31570,31130,26450,39055,40367,
36652
804 DATA 36384,44158,54794,6025
1,35216,35731,44085,29281,49845,
42930
806 DATA 42556,34171,17042,4965
4,40572,36841,41845,46800,48311,
38452
808 DATA 44963,46860,33246,4564
6,37411,37499,39522,42336,38070,
34530
810 DATA 48885,29610,36304,5057
6,50900,55095,44303,35093,45869,
32393
812 DATA 56766,46065,54500,4351
2,47049,46401,49525,27934
820 DATA 2774606
999 DEF FN v(x)=x-48-(39 AND x>
96)
1000 CLEAR 32000
1005 LET a=63597: DIM a(60): LET
 f=0
1008 RESTORE 800: LET c=0: FOR i
=1 TO 60: READ a(i): LET c=c+a(i
)
1012 NEXT i: READ v
1014 IF c<>v THEN PRINT "Error i
n check lines 800 to 820": STOP
1015 FOR i=100 TO 770 STEP 10
1020 PRINT AT 0,0;i: RESTORE i:
LET c=0: READ a$
1030 FOR n=1 TO 51 STEP 2: LET v
=FN v(CODE a$(n+1))+16*FN v(CODE
 a$(n))
1035 LET c=c+v*(n+1)/2: POKE a,v
: LET a=a+1: NEXT n
1050 IF a(i/10-9)<>c THEN PRINT
"Error in line ";i: STOP
1060 NEXT i
1080 PRINT "No errors found"
```

RA

Ro Richardson with a piece of software to allow fast loading on your Spectrum.



THIS PROGRAM lets you load and save programs and code very fast without any extra hardware. It does this by using Ram to make a Ramdisc and by defining new Basic commands to access the disc. The new commands are kept as similar to the Spectrum's as possible, though many have no direct counterpart in the tape system.

There is no limit to the number of files that can be saved on the disc, but there is a limit to the total size of stored files. The Ramdisc usually stores about 33K but this depends on where you put Ramtop — by Clearing. Each file is stored with a 17 byte header as in the tape system.

To use the Ramdisc, type in the hex loader — listing 1 — Save it on tape and Run it. The data has checksums so any errors should be spotted. Once it runs type

RANDOMIZE USR 63600

to switch the new commands on. A Ramdos — Ramdisc operating system — logo should now appear on the bottom of the screen. The new commands are now active. You can use any Basic command without interfering with the Ramdos. As the whole system is above Ramtop, you can use New without losing the files

MDISC

ce



stored. The easiest way to save code to tape is with the *t command — see later.

All commands consist of an asterisk followed by a lower case letter, possibly followed by parameters.

**l Load* — must be followed by a file name as a string up to 10 characters. If file name is null (" ") then the most recently saved file of the correct type — program or code — will be loaded. Options Screen$ and Code are provided and are exactly the same as the tape versions. Data is not available.

**s Save* — must be followed by a file name. The name may not be null. Options Code, Screen$ and Line are provided and are the same as the tape versions. Data is not supported, but programs are saved with their variables. When a file under the same name — and type — is already on the disc, it is overwritten. The file is also moved to the top of the disc.

**m Merge* — only works with program files, works the same as the tape version.

**d Delete* — must be followed by a file name. You must specify Code to delete a code file. If the file name is null then the most recently saved file is deleted.

**c Catalogue* — has no parameters. It prints a list of all files on the disc in exactly the same way as Load prints file names for the cassette system. It also prints the number of available bytes on the Ramdisc.

**e Erase* — erases the whole Ramdisc.

**t Tape* — must be given a file name. It saves all the files on the Ramdisc and the Ramdisc operating system to tape as a standard code file. This means that you can save and load a whole environment in one chunk of code. To load the file from Basic,

```
CLEAR 30000
```

or whatever value you are using,

```
LOAD "" CODE
```

and then

```
RANDOMIZE USR 63600
```

to switch the new commands on.

**f Free* — prints the number of bytes free in the Basic system, ie. below Ramtop. You may need this value when deciding where to place Ramtop. To get the total available space in the machine add this value and the value from catalogue (*c).

**x Block delete* — deletes all Basic lines in the given range including the start and end lines. It is not strictly a Ramdos command, but is a very short routine and should be useful.

In addition the New command has been redefined to print the new logo, and the Clear command now checks that the new value of Ramtop will not cause the Ramdisc to be overwritten. In cases where this would occur, the report "Out of memory" is given.

Error conditions and messages.

4 Out of memory — occurs when saving to the Ramdisc when there is not enough space for the new file. The area to be reclaimed if the file already exists is taken into account, so deleting the old copy will have no effect. Try moving Ramtop down by Clearing. If it occurs during loading or merging then there isn't enough space in the Basic area for the program.

8 End of file — occurs when loading, merging or deleting a file which does not exist — ie. the end of directly had been found without finding the file. Sometimes occurs because you leave out the Code when loading bytes.

The value of Ramtop splits the available Ram into space for Basic and space for Ramdisc. A value of 30000 gives Basic reasonable space and leaves 34K for the Ramdisc. If you Clear too low Basic will reject your Ramtop, and if you Clear too high you will get the "Out of memory" error.

The method used for redefining commands consists of two pieces. First, a copy of the kernel of the Rom is made in Ram. The idea is that control will stay in the Ram, just calling Rom routines when required. There is one snag, the Rom routine check-end 1BEE throws away it's return address. To overcome this some code is inserted in the error routine in case new commands fail the syntax check.

Once this is done it is easy to define new commands, and I have left 25 bytes free in the jump table in case you want to add some. Disassemble from 64381, and move the instruction at 64422 down to accommodate your commands. If you don't like the default colours of white on black,

```
POKE 63714
```

with the attributes you want.

The main use of this system will probably be for small Basic programs under development, and for keeping utility programs handy. It also enables you to load and save screens very quickly, although you are limited to about four screens. There are other not so obvious uses though.

After I had written the program I still had the problem of generating the hex dump data statements. It is easy to print what looks like a program listing, but then you can't edit or run it.

I wrote a Basic program to poke the Data statements together with line numbers, line lengths and trailing Enter bytes into unused memory — just above Ramtop — then saved this as a code file on Ramdisc, poked around with the header to change it to a program, then loaded the program.

If you want to have other machine code in the machine you could put it in the printer buffer or UDG area if it is small enough. If it is too big you could put it just above Ramtop, and keep a careful watch on your Ramdisc size, or save a dummy chunk of code to reserve an area in the Ramdisc. ■

DATABA

John Dawson completes his series on databases with a look at recent developments.

THE FIRST TWO articles in this series examined how the structure of different databases makes them more or less suitable for different purposes, how information can be extracted from the database and how insecure all of the BBC databases really are despite the password "protection" offered in some of the packages.

This month I'll conclude the series by writing about recent developments to the Merlin database, the design of the input forms in all the programs and the miscellaneous conclusions that come out of using a database program for some time.

Merlin database, the program from Merlin Computer products in Swansea, now has a sort program for ordering the records into a particular sequence on disc. The Report Writer language has also been finalised and you can construct quite sophisticated high level programs for taking information from a file, manipulating it — by adding VAT to the price of an item in a stock list for example — and then printing the result — as an invoice — or by writing the result of the calculation back to the same, or another field in the record.

The command set

Figure 1 shows two of the sample Report Writer programs given names and telephone numbers in a neat, tabulated format in which the tab stops are set within the program. Commands must be preceded by a colon, labels — for Repeat, Gosub and Goto purposes — by a full stop and remarks by an asterisk.

The second example will extract data from the Inv Value, VAT%, Discount and Payment fields and write back to the record the values of Net Inv — net invoice — and Acc Bal — account balance. A label printing program is supplied that will print as many labels across the page as you need — Stardatabase is the other database that will print labels more than one wide.

The command set for the Report Writer program is as follows:

ADD a record	DISC (ON/OFF)
FGET S(x)	END FORM feed to printer
	FINPUT [F(x), S(x)]
GET S(x)	GOSUB label
GOTO label	IF condition THEN
INFILE "filename"	INPUT [F(x), S(x)]
MOVE [F(x), S(x)FIELD]	OUTFILE "filename"
PTR F(x)	PRINTER (ON/OFF)
READ a record	REPEAT
RETURN from a subroutine	SCREEN (ON/OFF)
STRLEN number	TRUNCATE (ON/OFF)
UNTIL condition	
WRITE a record back to the database	

Arithmetic and logical operators and a subset of Basic mathematical functions such as SQR, ABS and INT. Many of the commands are similar to Basic instructions and it shouldn't prove difficult to use the Report Writer provided that it is adequately backed up by a good instruction manual.

All the programs use screen Mode 7 for entering information. Three of the databases overcome the limitations of the Mode 7 format — 40 characters wide by 25 lines deep — by offering either multiple input screens — Acornsoft and the Merlin database — or a large input "card" over which the screen travels like a window — Datagem.

Solutions to problems

Figure 2 illustrates the different solutions to the problem of displaying a large record on a small screen. The Acornsoft database offers up to three screens on which you can set up a maximum of 32 fields. A field may be up to 240 characters long and words will be broken at the end of each line if you choose a field length in excess of 40 characters minus the length of the field title — maximum seven characters.

The Merlin database program allows you to allocate up to four screens for each record and the appropriate screen will be shown on the VDU as you enter information into a record. In other words the program will place the cursor at the start of each field in numerical order which may mean jumping from screen one to screen three, screen two and back to screen one if that is the convenient or easy way for you to enter data. Stardatabase is limited to a single screen of 920 characters and long field titles will encroach even further on to the amount of data you can store in a single record.

Datagem will let you set up a field that is as wide as the input card. A field must be contained on one line but, like Stardatabase and the Merlin database, Datagem allows you to place more than one field and the associated field title on one line.

The Acornsoft database differs from the other three programs in that the input form requires each field title to start at the left

Figure 1.

```
*
*                         CALCULATION AND WRITE BACK REPORT
*                              REPORT SOURCE LISTING REP3
:SCREEN ON :PRINTER ON
:REPEAT:F(0)=0:F(2)=0
:READ
:MOVE F(0),NET INV:MOVE F(2),ACC BAL
:MOVE INV VAL,F(1)
:MOVE VAT,F(3)
:MOVE PAYMENT,F(4)
:MOVE DISC,F(5)
:F(0)=F(1)*(1+(F(3)/100))*((100-F(5))/100)
:F(2)=F(2)-F(4)+F(0)
:MOVE F(0),NET INV:MOVE F(2),ACC BAL
:WRITE
*
*NET INV*...        *ACC BAL*...
*


:UNTIL EOF
*
* NOTE THE USE OF THE WRITE COMMAND TO UPDATE THE NET INVOICE AND ACCOUNT
* BALANCE VALUES.
* NOTE ALSO THAT THE USE OF THE WRITE COMMAND DICTATES THAT THE DATABASE
* MUST BE RESTRUCTURED BEFORE FURTHER EDITING CAN TAKE PLACE.
*
*      E X A M P L E   O F   S I M P L E   T A B U L A T I O N   R E P O R T
*
:SCREEN ON :PRINTER ON
:REPEAT
+--------+-------------------+-------+--------+--------+----------------+
!  No.   ! Name              ! TEL   ! Inits  !  DATE  !
+--------+-------------------+-------+--------+--------+----------------+
:REPEAT :READ :F(0)=F(0)+1                                               !
!*F(0)6* ! *Name*.............!*TEL*.!*inits*.!*DATE*..! *COMMS*............!
:UNTIL LINE > 20OR EOF
+--------+-------------------+-------+--------+--------+----------------+
:FORM:UNTIL EOF
*
*                  ============================
*
* NOTE THE USE OF A '*' AS A REM STATEMENT. I.E. ANY TEXT PRECEDED BY AN
* ASTERISK IN COLUMN 1, WILL BE IGNORED BY THE REPORT WRITER ON PRINTOUT.
*
* DO NOT USE A RETURN MARKER ALONE IN A LINE UNLESS YOU INTEND THAT A LINE
* FEED SHOULD BE SENT TO THE PRINTER.
*
* USE '*' IN COLUMN 1 TO SEPARATE GROUPS OF PROGRAM COMMANDS OR TEXT ON
* SCREEN WHEN MORE READABILITY IS WANTED
*
* ALWAYS INSERT A RETURN AT THE END OF EACH LINE. IF WORD WRAP OCCURES
* GO BACK AND INSERT THE RETURN OR THE LINE WILL BE OVERPRINTED.
* I.E. NO LINE FEED COMMAND IS SENT BY WORD WRAPPED TEXT. ALTERNATELY
* IF YOU NEED PRINTOUT LONGER THAN 80 COLUMNS WORD WRAPPED TEXT WILL
* PRODUCE IT.
```

ASES

margin. The result of the more flexible approach taken by the more expensive programs is that you can simulate an existing paper record, with which people may be familiar already.

Despite the simple input capability of the Acornsoft database it is effective and easy to use. When you remember the limitations of View in terms of using long fields as "macros", this database offers all you will need for storing names, addresses and other non-textual data.

Stardatabase treats the field with the lowest ASCII code as the keyfield. This means that a field identified by the field tag Address1 has a lower ASCII value than a field tag Name or Address2. Figures come before alpha characters — upper and lower case letters — in the ASCII table and you can force the program to treat the Name field tag as the keyfield by calling it Oname.

Using easily identifiable field names is important because Stardatabase expects you to know the field name — not the field title displayed on the screen — when you set up a search pattern or a sort list.

In contrast, Datagem permits you to search or sort on any field by specifying the number of the field in the search line. The following line will search for a named person "George Sanderson" in field number one:

F1 = "George Sanderson"

If one or more records are found in which "George Sanderson" is the string of characters in F1, markers identifying the records will be placed in the search level that you have selected. You can search for an exact match or something that approximates to what you are looking for in one or all the fields in the database using the search line:

F£ = "£ander£"

where the left hand F£ searches all the fields and the right hand expression will find the string "ander" in Mander, Sanderson, Anderson, Landerfield and so on. Datagem has the most powerful search facilities of all the databases I have examined and while Datagem is not the speediest database when it is actually calculating and computing, it gains heavily in terms of the time it will take you to formulate your search and carry it out.

Searching a record set

In other words the design of Datagem, far from perfect as it is, more than makes up for its comparatively leisurely performance in this area. Curiously, the Acornsoft database seems to me to be the next most useful program in terms of ease of searching a set of records. There is no multiple level search facility in the Acornsoft program but the fuzzy search facilities are a good match for those in Datagem. Sx makes you carry out serial searches, progressively refining a subset of records from the main database, until you arrive at the specification that you require.

There is no real disadvantage in this method but Sx has been so precisely designed that the repeated operations become tedious. Remember that this is the database that I have chosen for routine use at work because it provides the optimum performance for the tasks that I wish to have done on the BBC computer.

I do wish, however, that the designer of Sx had studied the humans who use his program. In their sloppy way they want to simply find someone or something as quickly as possible with as few keystrokes as possible.

Having to go to the Search sub-menu, clear the current subset to zero records, decide which field the person or object will occur in, remember the names of the fields without being able to display them on screen — was it Key or Keywords or Keyword — carry out the search, return to the main menu and select browse or amend mode before finally displaying the required information is unnecessarily complicated.

Datagem can also export data to View and Wordwise but if you want to insert the name of a book, a sentence or some other information that may vary in length into a line of text I think you would have to spool the completed printout to disc and then load it back into View in order to reformat the text before it could be printed properly.

Datagem is a complete package which contains little information about the possibilities of accessing data in a database using any program other than the facilities in the program Rom.

The Merlin database has a sophisticated report writing package available on disc and this method of producing software — core program in Rom and utilities and extensions on disc — seems to offer a very good combination. The Report Writer section of the program is new and will take some time to access in depth.

Nevertheless, if you need to handle paragraphs of text in a card index type of database, and if you need to set up routine searches that lead to predetermined and complex reports then the Merlin database may be just what you are looking for. Certainly none of the others will fill these needs as well.

Sx has several attractive features. The program is supplied with information about a large number of very useful procedures and "Star" calls for accessing the data in a Sx file. At the same time you should be aware that the Basic software supplied with the Sx chip is not error free.

If you try to add a page header to a report form from disc you are rewarded with a persistent error message. Other combinations of circumstances cause the utility software to hang up, but at least it is written in common or garden Basic and you can have a crack at correcting it, or modifying it to your particular needs.

Set against that, the Report Writer language for the Merlin package is compiled and enables you to produce a reporting program that cannot be easily deciphered by users who purchase a system from you.

Datagem has the best financial facilities of all the packages and Sx has potentially the worst because it handles all numbers as strings, rather than integers or real numbers, and, consequently, has no data validation. Additionally, Sx won't even search on the full six figures needed to describe a unique data in the twentieth century.

Data manipulation

You will need to read the Datagem manual carefully to appreciate the potential that it has for sophisticated numerical data manipulation. You will need to read the Datagem manual carefully to get much information from it. Written by the author of the program and one other person, it is a masterpiece of compact information leading to subtle confusion.

In all the discussion about the expensive systems it is very easy to overlook the cheap but capable Acornsoft package; probably for just that reason — it's cheap. If you can cope with seven letter field titles, a very slow sort function, the limitations of data export to View — shared with other database programs — and the obvious problems of swapping program and data discs if you have only one disc drive, then the Acornsoft program offers stunningly good value for money.

The data on a disc is organised in such a way as to make it accessible to Basic programs, the search facilities are good, the manual is far more helpful than those supplied with the View wordprocessor and it's a pleasant and effective package to use. ■

Figure 2. Datagem — Data input card.

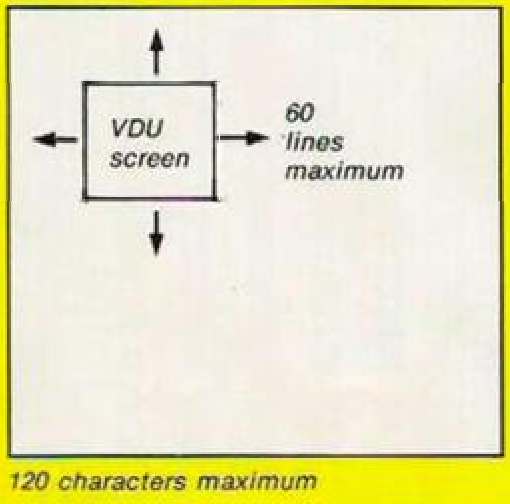
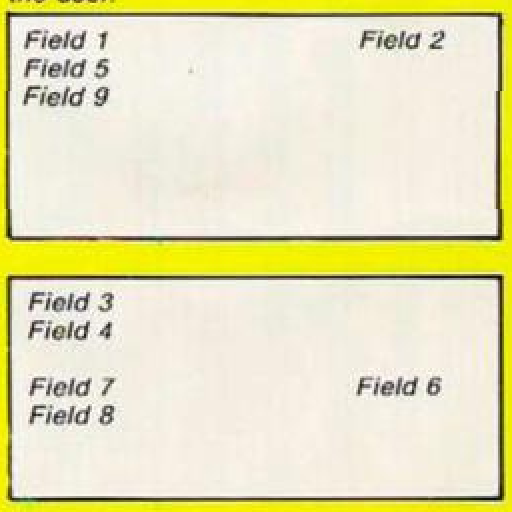
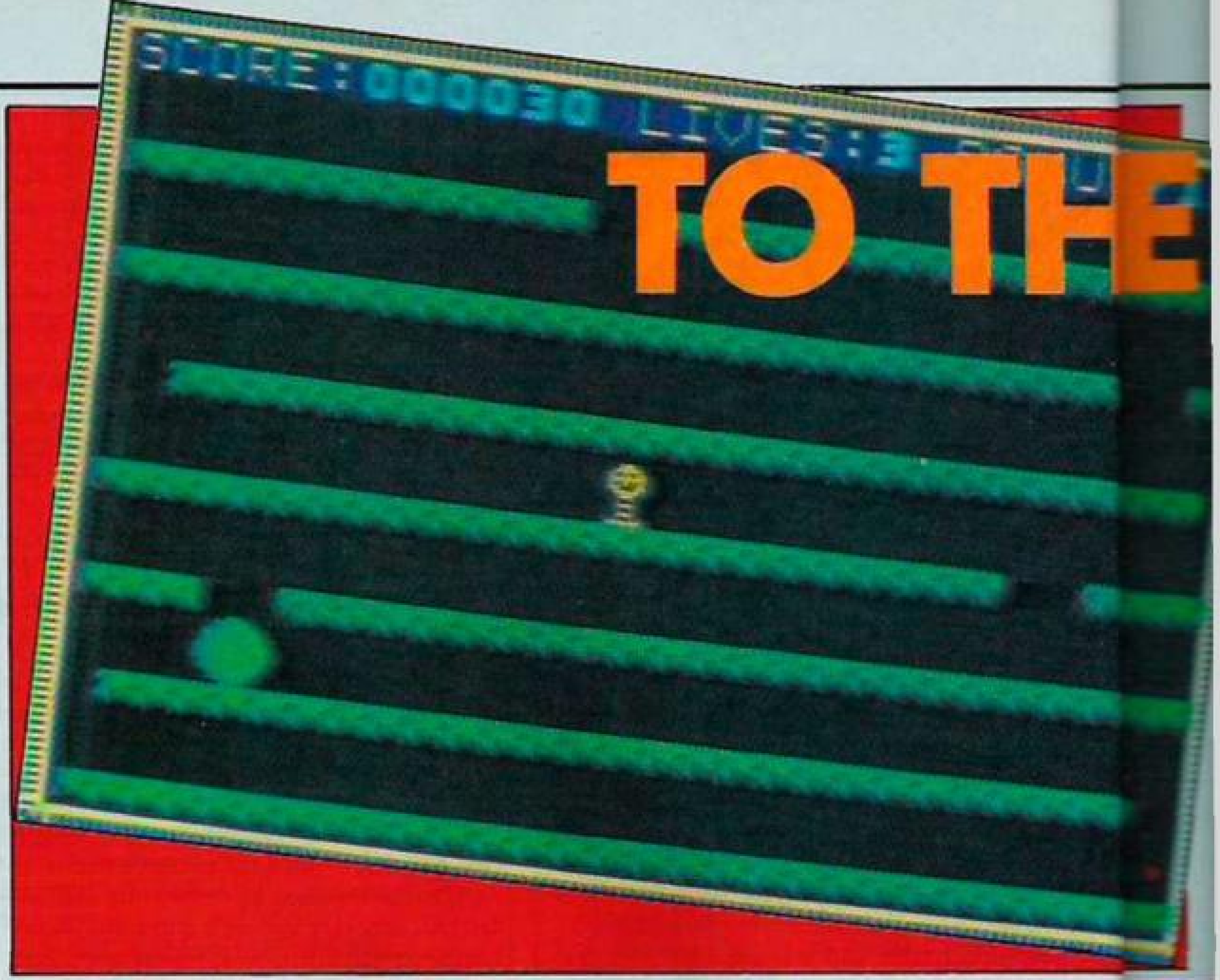


Figure 2a. Merlin DataScribe database. Multiple input screens with fields placed in the order of input most convenient to the user.



TO THE



To THE TOP is a game for the 48K Spectrum, featuring smooth animated sprite graphics, music, continuous sound, and a high score table. The object of the game is to move your man to the top-right hand side of the screen as quickly as possible, guiding him through the holes in the moving platforms which become faster the higher he gets.

However, he is not alone. To accompany him are various moving objects whose touch is lethal. On the first screen, there is only a rotating ball — which moves down the screen by falling through the platforms — to contend with but, on further levels, he is joined by several other characters, including a Pacman, a space invader and a beefburger in baps. These all move across the screen from left to right, gradually working their way down.

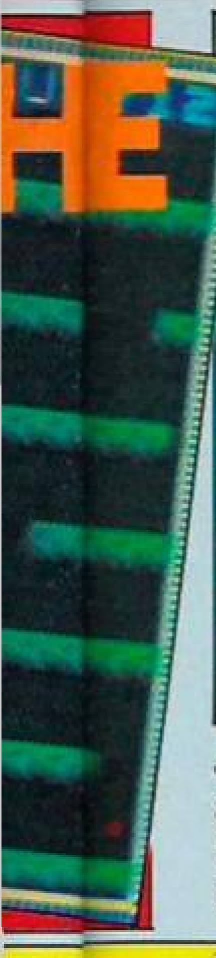
In order to speed you up a bit, there is a bonus which decreases as time passes. What is left of your bonus on completion of a screen is added to your score. If you can ever complete the first seven levels with your three lives — surely this isn't possible? — a congratulatory tune is played, you get an extra life, and the game goes back to the first screen, with faster moving platforms.

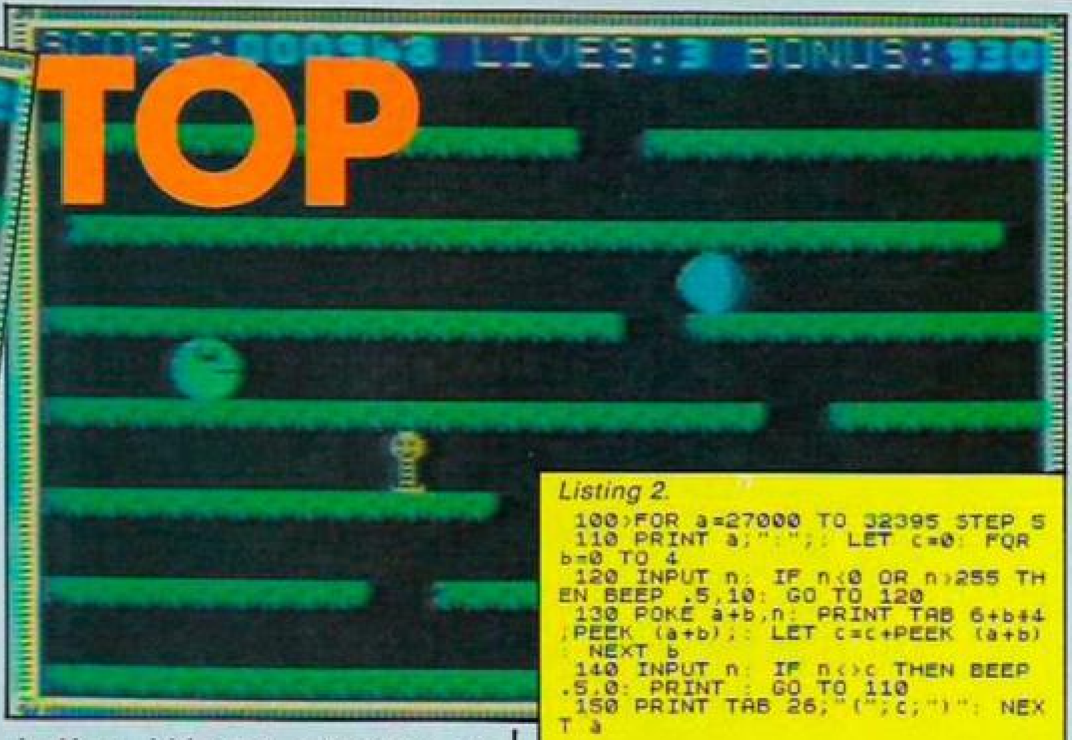
The control keys for the game are given in the instructions in the game, but note that, to

Listing 1.

27000	1	24	252	205	140	(622)
27005	105	1	156	255	205	(722)
27010	140	105	14	246	205	(710)
27015	140	105	125	24	8	(402)
27020	62	255	9	60	56	(442)
27025	252	237	66	205	238	(998)
27030	105	201	17	0	0	(323)
27035	14	7	205	221	105	(552)
27040	42	0	91	58	2	(193)
27045	91	1	16	39	25	(172)
27050	237	66	56	6	60	(425)
27055	50	2	91	24	1	(168)
27060	9	235	6	255	38	(543)
27065	0	111	205	132	105	(553)
27070	235	34	0	91	205	(565)
27075	120	105	201	14	20	(460)
27080	205	221	105	58	3	(592)
27085	91	254	10	220	238	(813)
27090	105	201	14	28	205	(553)
27095	221	105	205	126	105	(762)
27100	201	62	77	50	143	(533)
27105	92	6	1	205	26	(330)
27110	106	201	217	1	0	(525)
27115	60	24	5	217	237	(543)
27120	75	123	92	237	91	(618)
27125	132	92	38	0	111	(373)
27130	41	41	41	9	122	(254)
27135	15	15	15	230	3	(278)
27140	246	88	71	75	58	(538)
27145	143	92	2	6	8	(251)
27150	126	18	20	35	16	(215)
27155	250	33	132	92	52	(559)
27160	217	201	229	120	15	(782)
27165	15	15	230	224	177	(661)
27170	111	120	230	24	246	(731)
27175	64	103	34	132	92	(425)
27180	225	201	33	0	64	(523)
27185	62	88	54	0	35	(239)
27190	188	32	250	62	91	(623)
27195	113	35	188	32	251	(619)
27200	201	211	254	50	72	(788)
27205	92	201	62	1	238	(594)
27210	24	211	254	79	229	(797)
27215	43	124	181	32	251	(631)
27220	225	27	122	179	121	(674)
27225	32	238	201	26	254	(751)
27230	255	200	254	33	32	(774)
27235	7	19	26	50	143	(245)
27240	92	24	26	48	19	(209)
27245	79	19	26	254	33	(411)
27250	56	6	205	136	106	(509)
27255	27	24	11	71	205	(338)
27260	26	106	24	5	214	(375)
27265	34	205	238	105	19	(601)
27270	24	212	42	132	92	(502)
27275	120	6	0	9	71	(206)
27280	34	132	92	201	1	(460)
27285	1	0	205	26	106	(338)
27290	6	30	62	24	205	(327)
27295	238	105	16	249	6	(614)
27300	23	205	26	106	6	(366)
27305	30	62	31	205	238	(566)
27310	105	16	249	6	1	(377)
27315	14	0	205	26	106	(351)
27320	62	30	205	238	105	(640)
27325	14	30	205	136	106	(491)
27330	62	29	205	238	105	(639)
27335	4	120	254	24	32	(434)
27340	230	17	212	106	205	(770)
27345	92	106	201	0	0	(399)
27350	61	30	59	0	23	(173)
27355	62	30	60	33	57	(242)
27360	255	217	33	121	92	(718)
27365	94	52	22	4	26	(198)
27370	43	134	230	27	198	(632)
27375	2	217	201	30	4	(454)
27380	33	29	91	123	50	(326)
27385	143	92	14	1	67	(317)
27390	205	26	106	6	30	(373)
27395	62	22	205	238	105	(632)
27400	16	249	67	123	198	(653)
27405	3	95	254	25	200	(577)
27410	205	225	106	79	13	(628)
27415	13	7	7	7	119	(153)
27420	205	26	106	62	23	(422)
27425	205	238	105	62	23	(633)
27430	205	238	105	35	24	(607)
27435	207	62	1	205	65	(540)
27440	106	14	0	205	46	(371)
27445	106	205	242	106	17	(676)
27450	79	107	205	92	106	(589)
27455	205	148	106	205	198	(862)
27460	105	205	152	105	205	(772)
27465	212	105	205	149	108	(779)
27470	201	1	1	33	78	(314)
27475	44	45	46	47	48	(230)
27480	49	6	57	50	51	(213)
27485	52	48	44	49	43	(236)
27490	57	53	46	55	54	(265)
27495	44	49	33	78	255	(459)
27500	33	27	91	78	121	(350)
27505	60	254	7	32	2	(355)
27510	62	1	119	35	126	(343)
27515	6	4	35	31	220	(296)
27520	137	107	4	4	4	(256)
27525	13	32	245	201	245	(736)
27530	126	15	15	15	230	(401)
27535	31	197	79	120	15	(442)
27540	15	15	230	224	177	(661)
27545	95	120	230	24	246	(715)
27550	64	87	126	230	7	(514)
27555	71	62	7	144	71	(355)
27560	175	55	23	16	253	(522)
27565	61	205	211	107	71	(655)
27570	121	254	3	229	33	(640)
27575	28	0	56	3	33	(120)
27580	254	255	25	235	225	(994)
27585	120	47	205	211	107	(690)
27590	193	126	60	60	254	(693)
27595	248	32	2	62	8	(352)
27600	119	241	201	213	217	(991)
27605	79	209	122	15	15	(440)
27610	15	230	3	246	88	(582)
27615	103	107	54	4	33	(301)
27620	60	121	6	8	126	(321)
27625	161	18	20	35	16	(250)
27630	249	121	217	201	237	(1025
27635	91	123	92	111	38	(455)
27640	0	41	41	41	25	(148)
27645	235	221	78	1	221	(756)
27650	70	2	197	205	44	(518)
27655	108	193	221	117	3	(642)
27660	221	116	4	33	240	(614)
27665	255	25	235	12	121	(648)
27670	254	31	32	12	14	(343)
27675	1	4	4	4	120	(133)
27680	254	20	32	2	6	(314)
27685	2	221	113	1	221	(558)
27690	112	2	120	15	15	(264)
27695	15	230	224	177	111	(757)
27700	120	230	24	246	64	(684)
27705	103	229	6	8	26	(372)
27710	119	36	19	16	250	(440)
27715	1	32	248	9	235	(525)
27720	1	8	0	9	235	(253)
27725	65	26	119	36	19	(265)
27730	16	250	37	124	15	(442)
27735	15	15	230	3	246	(509)
27740	88	103	221	126	0	(538)
27745	119	1	224	255	9	(608)
27750	119	225	201	221	110	(876)
27755	3	221	102	4	175	(505)
27760	6	8	119	36	16	(185)
27765	252	1	32	248	9	(542)
27770	6	8	119	36	16	(185)
27775	252	201	33	26	91	(603)
27780	126	203	127	40	2	(498)
27785	62	252	198	4	254	(770)
27790	12	32	2	62	132	(240)
27795	119	201	221	33	37	(611)
27800	91	237	75	8	91	(502)
27805	120	254	0	200	17	(591)
27810	20	2	205	225	106	(558)
27815	230	3	198	67	221	(719)
27820	119	0	205	225	106	(655)
27825	221	119	1	221	114	(676)
27830	2	20	20	20	123	(185)
27835	198	12	95	217	205	(727)
27840	242	107	17	5	0	(371)
27845	221	25	217	16	218	(697)
27850	201	33	26	91	54	(405)
27855	0	35	54	1	35	(125)
27860	54	254	62	4	50	(424)
27865	36	91	33	140	120	(420)
27870	34	123	92	33	118	(400)
27875	92	54	5	35	54	(240)
27880	0	33	231	3	34	(301)
27885	4	91	175	50	14	(334)
27890	91	33	102	91	54	(371)
27895	1	35	54	0	35	(125)
27900	205	225	106	230	3	(769)
27905	198	4	119	35	54	(410)
27910	8	35	54	16	35	(148)
27915	54	1	33	22	91	(201)
27920	54	7	35	54	0	(150)
27925	33	124	160	34	24	(375)
27930	91	205	44	107	205	(652)
27935	173	110	205	19	112	(619)
27940	243	62	40	237	71	(653)
27945	237	94	253	33	19	(636)
27950	91	253	54	0	0	(398)
27955	251	205	108	107	42	(713)
27960	6	91	235	253	126	(711)
27965	0	183	192	42	24	(441)
27970	91	1	238	16	167	(513)
27975	237	66	200	235	43	(781)
27980	124	181	32	234	24	(595)
27985	226	33	36	91	53	(439)
27990	194	177	109	54	5	(539)
27995	205	129	108	230	127	(799)
28000	198	20	79	58	9	(364)
28005	91	183	200	71	221	(766)
28010	33	37	91	197	205	(563)
28015	105	108	193	121	198	(725)
28020	12	79	197	205	242	(735)
28025	107	1	5	0	221	(334)
28030	9	193	16	235	201	(654)
28035	33	120	92	53	1	(299)
28040	254	223	237	120	203	(1037)
28045	71	192	237	120	203	(823)
28050	71	40	250	175	211	(747)
28055	254	60	230	7	111	(662)

HE TOP





Julian Wood climbs to success by avoiding invaders and a beefburger in baps.

Listing 2.

```
 100>FOR a=27000 TO 32395 STEP 5
 110 PRINT a;":";: LET c=0: FOR
b=0 TO 4
 120 INPUT n: IF n<0 OR n>255 TH
EN BEEP .5,10: GO TO 120
 130 POKE a+b,n: PRINT TAB 6+b*4
;PEEK (a+b);: LET c=c+PEEK (a+b)
: NEXT b
 140 INPUT n: IF n<>c THEN BEEP
.5,0: PRINT : GO TO 110
 150 PRINT TAB 26;"(";c;")": NEX
T a
```

Listing 3.

```
  10>PAPER 0: INK 0: BORDER 0: C
LEAR 25000: PRINT PAPER 1; INK 7
; BRIGHT 1; FLASH 1;AT 11,4;""TO
 THE TOP" IS LOADING"
  20 LOAD ""CODE : RANDOMIZE USR
 29397
```

make things a little less impossible, your man has the advantage of a wrap-around screen.

To enter the game, first type in the machine-code loader in listing 23, with which you can enter all the machine code in listing 1. With listing 1, in the left-hand column are the memory address, and in the right hand column are the checksum values. Enter the five codes in between, and then the checksum value for that line.

If you have made a mistake in entering the line, a tone will sound, and you will have to enter that line again. If you enter a hopelessly wrong value for one of the machine-code bytes, a different tone will sound, and you just have to enter that byte again. Basically, all that is shown in listing 1 should tally with what is being printed onto the screen while you are entering the machine code.

When you have entered all the 5400 bytes of machine code, and are satisfied that all is correct, type New after entering

CLEAR 26999

to get rid of the Basic, whilst retaining the machine code. Then enter the program in listing 3, and save the two parts of the game using:

SAVE "TO THE TOP" LINE 0:
SAVE "C" CODE 27000,5400

Verify, and you are then ready to play.

28060:	17	13	1	27	122	(180)
28065:	179	32	251	219	254	(935)
28070:	47	230	31	125	40	(473)
28075:	234	62	1	211	254	(762)
28080:	201	126	254	1	192	(774)
28085:	42	4	91	124	181	(442)
28090:	200	43	34	4	91	(372)
28095:	205	212	105	201	0	(723)
28100:	237	91	123	92	38	(581)
28105:	0	111	41	41	41	(234)
28110:	25	229	221	225	8	(708)
28115:	121	230	7	17	255	(630)
28120:	8	40	11	88	71	(218)
28125:	87	62	1	15	16	(181)
28130:	253	67	61	95	205	(681)
28135:	30	110	217	1	8	(366)
28140:	0	221	9	217	205	(652)
28145:	30	110	120	61	7	(328)
28150:	7	230	3	246	88	(574)
28155:	103	120	1	2	2	(228)
28160:	230	7	40	1	12	(290)
28165:	203	90	32	1	4	(330)
28170:	22	255	62	224	128	(691)
28175:	95	58	104	91	197	(545)
28180:	119	45	16	252	193	(625)
28185:	25	13	32	246	201	(517)
28190:	62	8	8	197	120	(395)
28195:	31	55	31	167	31	(315)
28200:	168	230	248	168	103	(917)
28205:	121	7	7	7	168	(310)
28210:	230	199	168	7	7	(611)
28215:	111	221	126	0	221	(679)
28220:	78	8	66	221	35	(408)
28225:	15	203	9	16	251	(494)
28230:	71	163	182	119	44	(579)
28235:	203	90	121	32	13	(459)
28240:	123	47	160	71	121	(522)
28245:	163	176	182	119	44	(684)
28250:	123	47	161	182	119	(632)
28255:	193	4	8	61	32	(298)
28260:	187	201	237	91	105	(821)
28265:	91	123	230	7	32	(483)
28270:	2	62	8	71	79	(222)
28275:	62	1	15	16	253	(347)
28280:	71	5	62	16	8	(162)
28285:	205	149	110	203	89	(756)
28290:	32	5	120	47	166	(370)
28295:	119	44	54	0	44	(261)
28300:	120	166	119	20	8	(433)
28305:	61	32	232	201	122	(648)
28310:	167	31	55	31	167	(451)
28315:	31	170	230	248	170	(849)
28320:	103	123	7	7	7	(247)
28325:	170	230	199	170	7	(776)
28330:	7	111	201	237	91	(647)
28335:	105	91	33	118	92	(439)
28340:	53	32	12	54	5	(156)
28345:	35	126	198	4	254	(617)
28350:	16	32	1	175	119	(343)
28355:	33	103	91	126	183	(536)
28360:	40	24	20	53	32	(169)
28365:	13	43	52	70	62	(240)
28370:	64	7	16	253	33	(373)
28375:	28	91	182	119	58	(478)
28380:	119	92	198	120	24	(553)
28385:	71	33	107	91	28	(330)
28390:	203	70	32	2	29	(336)
28395:	29	123	254	8	40	(454)
28400:	4	254	232	32	15	(537)
28405:	126	47	119	122	254	(668)
28410:	160	32	7	22	16	(237)

28415:	62	1	50	102	91	(306)
28420:	237	75	102	91	6	(511)
28425:	0	33	28	91	9	(161)
28430:	126	214	16	187	32	(575)
28435:	5	62	24	50	103	(244)
28440:	91	33	107	91	58	(380)
28445:	119	92	198	104	203	(716)
28450:	70	40	4	71	62	(247)
28455:	220	144	237	83	105	(789)
28460:	91	66	75	205	196	(633)
28465:	109	58	102	91	71	(431)
28470:	62	127	7	16	253	(465)
28475:	33	28	91	166	119	(437)
28480:	201	111	38	0	41	(391)
28485:	41	41	237	91	123	(533)
28490:	92	25	229	221	225	(792)
28495:	197	121	230	7	32	(587)
28500:	2	62	8	71	87	(230)
28505:	62	1	15	16	253	(347)
28510:	95	29	193	62	8	(387)
28515:	8	120	167	31	55	(381)
28520:	31	167	31	168	230	(627)
28525:	248	168	103	121	7	(647)
28530:	7	7	168	230	199	(611)
28535:	168	7	7	111	197	(490)
28540:	229	205	180	111	225	(950)
28545:	36	205	180	111	193	(725)
28550:	4	4	8	61	32	(109)
28555:	215	124	15	15	15	(384)
28560:	230	3	246	88	103	(670)
28565:	203	90	120	17	226	(656)
28570:	255	6	2	40	2	(305)
28575:	5	29	230	7	14	(285)
28580:	3	32	1	13	120	(169)
28585:	54	6	45	16	251	(372)
28590:	25	71	13	32	246	(387)
28595:	201	66	221	126	0	(614)
28600:	221	35	15	16	253	(540)
28605:	71	203	90	32	12	(408)
28610:	166	163	40	3	253	(625)
28615:	119	0	120	163	182	(584)
28620:	119	44	123	47	160	(493)
28625:	71	166	40	3	253	(533)
28630:	119	0	120	182	119	(540)
28635:	201	237	91	24	91	(644)
28640:	123	230	7	32	2	(394)
28645:	62	8	71	79	62	(282)
28650:	1	15	16	253	71	(356)
28655:	5	62	8	8	205	(288)
28660:	149	110	229	205	6	(699)
28665:	112	225	36	205	6	(584)
28670:	112	20	20	8	61	(221)
28675:	32	237	201	203	89	(762)
28680:	32	5	120	47	166	(370)
28685:	119	44	120	166	119	(568)
28690:	201	237	91	24	91	(644)
28695:	58	23	91	183	40	(395)
28700:	81	33	21	91	126	(352)
28705:	20	20	203	126	40	(409)
28710:	4	21	21	21	21	(88)
28715:	35	35	53	32	36	(191)
28720:	43	134	119	33	21	(350)
28725:	91	71	203	126	32	(523)
28730:	1	5	62	128	7	(203)
28735:	16	253	33	28	91	(421)
28740:	182	119	58	21	91	(471)
28745:	203	127	40	29	33	(432)
28750:	14	91	54	25	24	(208)
28755:	22	58	22	91	33	(226)
28760:	21	91	71	203	126	(512)
28765:	40	1	5	62	127	(235)

28770:	7	16	253	33	28	(337)
28775:	91	166	119	62	136	(574)
28780:	24	112	1	254	254	(645)
28785:	237	120	71	203	72	(703)
28790:	123	32	8	254	8	(425)
28795:	32	2	30	240	29	(333)
28800:	29	203	80	32	8	(352)
28805:	254	238	32	2	30	(556)
28810:	6	28	28	33	14	(109)
28815:	91	126	183	40	3	(443)
28820:	53	24	32	33	22	(164)
28825:	91	78	6	0	33	(208)
28830:	28	91	9	126	147	(401)
28835:	254	8	56	16	254	(588)
28840:	16	48	12	33	23	(132)
28845:	91	54	12	33	21	(211)
28850:	91	54	1	24	31	(201)
28855:	1	254	127	237	120	(739)
28860:	31	56	23	122	254	(486)
28865:	16	40	18	213	17	(304)
28870:	10	0	205	155	105	(475)
28875:	209	33	23	91	54	(410)
28880:	12	33	21	91	54	(211)
28885:	255	58	26	91	230	(660)
28890:	127	15	198	136	213	(689)
28895:	66	75	253	54	0	(448)
28900:	0	205	65	111	209	(590)
28905:	237	83	24	91	201	(636)
28910:	78	121	50	143	92	(484)
28915:	229	205	46	106	225	(811)
28920:	35	126	205	65	106	(537)
28925:	35	126	203	127	40	(531)
28930:	22	230	127	40	11	(430)
28935:	254	127	200	71	35	(687)
28940:	78	205	26	106	24	(439)
28945:	10	35	126	50	143	(364)
28950:	92	24	3	205	232	(556)
28955:	105	35	24	223	243	(630)
28960:	125	203	61	203	61	(653)
28965:	47	230	3	79	6	(365)
28970:	0	221	33	209	3	(466)
28975:	221	9	58	72	92	(452)
28980:	205	209	3	201	229	(847)
28985:	33	136	115	205	238	(727)
28990:	112	1	5	9	33	(160)
28995:	9	92	54	35	35	(225)
29000:	54	5	225	175	50	(509)
29005:	65	92	50	106	92	(405)
29010:	175	50	8	92	58	(383)
29015:	8	92	254	13	200	(567)
29020:	254	14	32	10	58	(368)
29025:	65	92	238	1	50	(446)
29030:	65	92	24	70	254	(505)
29035:	6	32	10	58	106	(212)
29040:	92	238	8	50	106	(494)
29045:	92	24	56	254	12	(438)
29050:	32	14	62	5	185	(298)
29055:	40	47	13	43	54	(197)
29060:	32	205	26	106	24	(393)
29065:	28	203	127	32	200	(590)
29070:	254	32	56	196	95	(633)
29075:	175	50	65	92	62	(444)
29080:	25	185	40	186	205	(641)
29085:	26	106	123	119	35	(409)
29090:	205	232	105	12	62	(616)
29095:	95	205	232	105	62	(699)
29100:	32	205	232	105	217	(791)
29105:	33	200	0	17	0	(250)
29110:	0	205	31	113	217	(566)

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29115	24	149	221	33	106	(533)
29120	119	42	0	91	88	(309)
29125	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29130	190	2	86	13	32	(293)
29135	20	221	94	0	221	(556)
29140	[illegible]	[illegible]	237	92	25	(431)
29145	48	9	17	23	[illegible]	[illegible]
29150	221	25	16	231	24	(517)
29155	26	235	221	229	225	(936)
29160	115	35	114	35	119	(417)
29165	17	22	0	237	82	(358)
29170	229	6	20	54	32	(341)
29175	[illegible]	16	221	225	205	[illegible]
29180	55	113	32	1	118	[illegible]
29185	205	238	112	33	86	(674)
29190	118	6	4	14	1	(143)
29195	205	25	106	82	35	[illegible]
29200	50	143	92	38	20	(335)
29205	126	205	232	105	35	(703)
29210	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	(318)
29215	205	35	106	[illegible]	[illegible]	[illegible]
29220	86	35	62	88	50	(321)
29225	143	92	[illegible]	[illegible]	[illegible]	(625)
29230	157	235	[illegible]	[illegible]	[illegible]	(449)
29235	205	166	105	193	225	(894)
29240	4	[illegible]	120	254	80	(402)
29245	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29250	32	202	[illegible]	[illegible]	116	(378)
29255	47	230	31	40	248	(596)
29260	201	70	25	229	221	(756)
29265	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29270	230	31	192	221	94	(768)
29275	0	221	86	1	221	(529)
29280	112	2	221	182	3	[illegible]
29285	187	221	205	31	[illegible]	(435)
29290	113	221	225	[illegible]	[illegible]	(564)
29295	0	221	0	193	15	(439)
29300	221	221	174	176	[illegible]	(745)
29305	205	238	112	33	252	[illegible]
29310	124	17	0	[illegible]	[illegible]	[illegible]
29315	96	1	237	[illegible]	[illegible]	[illegible]
29320	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29325	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29330	40	248	1	254	223	(766)
29335	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29340	32	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29345	112	205	63	114	24	(518)
29350	207	23	137	32	88	(487)
29355	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29360	31	31	31	31	211	(335)
29365	254	16	246	45	32	(593)
29370	205	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29375	205	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29380	254	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29385	201	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29390	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29395	251	201	251	205	118	(1026)
29400	114	33	0	34	0	(181)
29405	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29410	62	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29415	175	50	9	91	33	(358)
29420	240	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29425	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29430	243	62	62	237	71	(675)
29435	237	86	253	33	58	(667)
29440	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29445	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29450	8	205	198	105	205	(721)
29455	202	114	24	202	205	(767)
29460	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29465	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29470	42	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29475	40	29	[illegible]	[illegible]	[illegible]	[illegible]
29480	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29485	205	185	105	225	229	(919)
29490	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29495	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29500	205	31	113	225	24	(598)
29505	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29510	126	254	[illegible]	[illegible]	[illegible]	[illegible]
29515	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29520	62	205	198	105	33	(593)
29525	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29530	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29535	33	14	119	205	[illegible]	[illegible]
29540	114	24	138	0	0	(276)
29545	0	0	0	0	0	(0)
29550	0	0	0	0	0	(0)
29555	0	0	0	0	0	(0)
29560	0	0	0	0	0	(0)
29565	0	0	0	0	0	(0)
29570	0	0	0	0	0	(0)
29575	0	15	0	129	1	(145)
29580	89	111	117	32	104	(453)
29585	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	(520)
29590	117	97	108	105	102	[illegible]
29595	105	101	100	32	102	(440)
29600	116	114	[illegible]	[illegible]	[illegible]	[illegible]
29605	116	114	121	108	116	[illegible]
29610	105	110	32	116	104	(467)
29615	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29620	101	32	[illegible]	[illegible]	[illegible]	[illegible]
29625	114	101	32	116	97	(460)
29630	98	108	101	46	[illegible]	[illegible]
29635	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29640	115	101	32	101	110	[illegible]
29645	116	101	114	32	[illegible]	[illegible]
29650	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29655	5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29660	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29665	65	80	[illegible]	[illegible]	[illegible]	[illegible]
29670	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29675	119	105	116	104	32	[illegible]
29680	39	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29685	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29690	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29695	108	108	32	116	104	(468)
29700	101	32	110	111	114	(468)
29705	109	97	108	32	109	(455)
29710	111	100	101	115	44	(471)
29715	105	110	99	108	117	(539)
29720	100	105	110	103	145	(563)
29725	1	67	65	80	83	(296)
29730	32	76	79	67	75	(329)
29735	44	99	97	110	32	(382)
29740	98	101	32	97	99	(427)
29745	99	101	115	115	101	(531)
29750	100	32	97	115	146	(490)
29755	1	117	115	117	97	(447)
29760	108	44	97	108	108	(465)
29765	111	119	105	110	103	(548)
29770	32	116	104	101	32	(385)
29775	117	115	101	32	111	(476)
29780	102	32	97	108	108	(447)
29785	147	1	116	104	101	(469)
29790	32	111	110	101	45	(399)
29795	108	101	116	116	101	(542)
29800	114	32	99	104	97	(446)
29805	114	97	99	116	101	(527)
29810	114	115	46	149	3	(427)
29815	80	114	101	115	115	(525)
29820	32	69	78	84	69	(332)
29825	82	32	119	104	101	(438)
29830	110	32	121	111	117	(491)
29835	32	104	97	118	101	(452)
29840	150	2	102	105	110	(469)
29845	105	115	104	101	100	(525)
29850	32	101	110	116	101	(460)
29855	114	105	110	103	32	(464)
29860	121	111	117	114	32	(495)
29865	110	97	109	101	255	(672)
29870	15	0	141	7	66	(229)
29875	121	32	74	117	108	(452)
29880	105	97	110	32	82	(426)
29885	69	32	87	111	111	(410)
29890	100	143	5	77	117	(442)
29895	115	105	99	32	98	(449)
29900	121	32	82	111	98	(444)
29905	101	114	116	32	82	(445)
29910	104	111	100	101	115	(531)
29915	147	3	80	114	101	(445)
29920	115	115	32	39	73	(374)

29925	39	32	102	111	114	(398)
29930	32	105	110	115	116	(478)
29935	114	117	99	116	105	(551)
29940	111	110	115	150	2	(488)
29945	128	143	32	65	78	(446)
29950	89	32	79	84	72	(356)
29955	69	82	32	75	69	(327)
29960	89	32	84	79	32	(316)
29965	80	76	65	89	32	(342)
29970	71	65	77	69	32	(314)
29975	255	7	1	132	2	(397)
29980	71	101	116	32	39	(359)
29985	83	112	114	105	110	(524)
29990	103	121	32	83	112	(451)
29995	114	105	116	101	39	(475)
30000	32	116	111	32	116	(407)
30005	104	101	133	1	116	(455)
30010	111	112	45	114	105	(487)
30015	103	104	116	32	104	(459)
30020	97	110	100	32	115	(454)
30025	105	100	101	32	111	(449)
30030	102	32	116	104	101	(455)
30035	134	1	115	99	114	(463)
30040	101	101	110	32	97	(441)
30045	115	32	113	117	105	(482)
30050	99	107	108	121	32	(467)
30055	97	115	32	112	111	(467)
30060	115	115	105	98	108	(541)
30065	101	44	135	1	98	(379)
30070	121	32	106	117	109	(485)
30075	112	105	110	103	32	(462)
30080	116	104	114	111	117	(562)
30085	103	104	32	116	104	(459)
30090	101	32	104	111	108	(456)
30095	101	115	136	1	105	(458)
30100	110	32	116	104	101	(463)
30105	32	112	108	97	116	(465)
30110	102	111	114	109	115	(551)
30115	44	119	104	105	108	(480)
30120	115	116	137	1	97	(466)
30125	118	111	105	100	105	(539)
30130	110	103	32	116	104	(465)
30135	101	32	109	111	118	(471)
30140	105	110	103	32	111	(461)
30145	98	106	101	99	116	(520)
30150	115	46	142	1	75	(379)
30155	69	89	83	58	90	(389)
30160	61	108	101	102	116	(488)
30165	44	88	61	114	105	(412)
30170	103	104	116	44	83	(450)
30175	80	65	67	69	61	(342)
30180	106	117	109	112	145	(589)
30185	3	80	61	112	97	(353)
30190	117	115	101	44	97	(474)
30195	110	121	32	107	101	(471)
30200	121	32	116	111	32	(412)
30205	114	101	115	116	97	(543)
30210	114	116	150	8	128	(516)
30215	135	32	80	82	69	(398)
30220	83	83	32	65	78	(341)
30225	89	32	75	69	89	(354)
30230	32	129	0	128	58	(354)
30235	32	73	78	83	84	(350)
30240	82	85	67	84	73	(391)
30245	79	78	83	32	255	(527)
30250	88	1	129	7	128	(353)
30255	45	32	72	73	71	(293)
30260	72	45	83	67	79	(346)
30265	82	69	32	84	65	(332)
30270	66	76	69	32	150	(393)
30275	8	128	143	32	80	(391)
30280	82	69	83	83	32	(349)
30285	65	78	89	32	75	(339)
30290	69	89	32	255	73	(518)
30295	116	97	110	32	78	(433)
30300	101	110	100	108	32	(451)
30305	32	32	32	32	32	(160)
30310	32	32	32	32	0	(128)
30315	0	90	82	111	120	(403)
30320	97	110	110	101	32	(450)
30325	32	32	32	32	32	(160)
30330	32	32	32	32	32	(160)
30335	32	32	0	0	50	(114)
30340	80	105	110	107	32	(434)
30345	70	108	111	121	100	(510)
30350	32	32	32	32	32	(160)
30355	32	32	32	32	32	(160)
30360	0	0	10	78	105	(193)
30365	99	107	32	70	97	(405)
30370	108	100	111	32	32	(383)
30375	32	32	32	32	32	(160)
30380	32	32	32	0	0	(96)
30385	5	68	101	98	98	(370)
30390	105	101	32	32	32	(302)
30395	32	32	32	32	32	(160)
30400	32	32	32	32	32	(160)
30405	32	0	0	1	71	(104)
30410	114	97	104	97	109	(521)
30415	32	32	32	32	32	(160)
30420	32	32	32	32	32	(160)
30425	32	32	32	32	136	(264)
30430	19	0	77	101	32	(229)
30435	77	121	115	101	108	(522)
30440	102	32	73	32	33	(272)
30445	32	32	32	32	32	(160)
30450	32	32	232	3	0	(299)
30455	83	111	109	101	111	(535)
30460	110	101	32	101	108	(452)
30465	115	101	63	32	32	(343)
30470	32	32	32	32	32	(160)
30475	100	0	0	15	30	(145)
30480	0	199	4	91	0	(294)
30485	199	4	30	0	199	(432)
30490	4	162	0	140	3	(309)
30495	162	0	140	3	182	(487)
30500	0	38	3	182	0	(223)
30505	38	3	110	1	84	(236)
30510	2	102	0	203	2	(309)
30515	161	0	140	3	40	(344)
30520	0	140	3	153	0	(296)
30525	203	2	40	0	140	(385)
30530	3	136	0	62	4	(205)
30535	179	1	161	2	136	(479)
30540	0	38	3	38	0	(79)
30545	196	3	69	1	140	(409)
30550	3	77	43	0	180	(303)
30555	3	48	0	96	5	(152)
30560	48	0	17	5	156	(226)
30565	0	38	3	48	0	(89)
30570	17	5	156	0	38	(216)
30575	3	48	0	17	5	(73)
30580	214	1	38	3	77	(333)
30585	0	38	3	87	0	(128)
30590	203	2	92	0	161	(458)
30595	2	98	0	122	2	(224)
30600	77	0	38	3	87	(205)
30605	0	203	2	197	0	(402)
30610	122	2	73	0	88	(285)
30615	3	175	0	203	2	(383)
30620	214	1	38	3	43	(299)
30625	0	180	5	46	0	(231)
30630	96	5	48	0	17	(166)
30635	5	156	0	38	3	(202)
30640	48	0	17	5	156	(226)
30645	0	38	3	48	0	(89)
30650	17	5	214	1	38	(275)
30655	3	68	0	196	3	(267)
30660	55	0	62	4	54	(175)
30665	0	128	4	65	0	(197)
30670	196	3	77	0	38	(314)
30675	3	197	0	122	2	(324)
30680	87	0	203	2	77	(369)
30685	0	38	3	65	0	(106)
30690	196	3	16	2	203	(420)
30695	2	43	0	180	5	(230)
30700	46	0	96	5	48	(195)
30705	0	17	5	156	0	(178)
30710	38	3	48	0	17	(106)
30715	5	156	0	38	3	(202)
30720	48	0	17	5	214	(284)
30725	1	38	3	77	0	(119)
30730	38	3	87	0	203	(331)
30735	2	92	0	161	2	(257)
30740	98	0	122	2	77	(299)
30745	0	38	3	87	0	(128)

30750	203	2	197	0	122	(524)
30755	2	73	0	88	3	(166)
30760	175	0	203	2	214	(594)
30765	1	38	3	77	0	(119)
30770	38	3	87	0	203	(331)
30775	2	98	0	122	2	(224)
30780	77	0	38	3	87	(205)
30785	0	203	2	197	0	(402)
30790	122	2	77	0	38	(239)
30795	3	87	0	203	2	(295)
30800	77	0	38	3	98	(216)
30805	0	122	2	77	0	(201)
30810	38	3	87	0	203	(331)
30815	2	197	0	122	2	(323)
30820	77	0	38	3	87	(205)
30825	0	203	2	77	0	(282)
30830	38	3	98	0	122	(261)
30835	2	77	0	38	3	(120)
30840	87	0	203	2	197	(489)
30845	0	122	2	73	0	(197)
30850	88	3	175	0	203	(469)
30855	2	214	1	38	3	(258)
30860	60	126	102	102	102	(492)
30865	102	126	60	6	24	(328)
30870	56	24	24	24	60	(188)
30875	60	124	126	6	62	(378)
30880	124	96	126	126	124	(596)
30885	126	6	62	60	6	(260)
30890	126	124	96	96	108	(550)
30895	108	126	126	12	12	(384)
30900	126	126	96	124	126	(598)
30905	6	126	124	60	124	(440)
30910	96	124	126	102	126	(574)
30915	60	126	126	14	28	(354)
30920	56	48	48	48	60	(260)
30925	126	102	60	126	102	(516)
30930	126	60	60	126	102	(474)
30935	126	62	6	62	60	(316)
30940	60	66	64	60	2	(252)
30945	2	60	60	60	66	(254)
30950	64	64	64	64	66	(322)
30955	60	60	66	66	66	(318)
30960	66	66	66	60	124	(382)
30965	66	66	66	124	72	(394)
30970	68	66	128	64	64	(388)
30975	124	64	64	64	126	(442)
30980	0	24	24	0	0	(48)
30985	24	24	0	64	64	(176)
30990	64	64	64	64	64	(320)
30995	126	124	16	16	16	(298)
31000	16	16	16	124	130	(302)
31005	130	130	130	130	68	(588)
31010	40	16	124	66	66	(312)
31015	124	66	66	66	124	(446)
31020	66	66	66	66	66	(330)
31025	66	66	60	66	98	(356)
31030	82	82	74	74	70	(382)
31035	66	255	255	254	253	(1083)
31040	223	219	202	66	0	(710)
31045	0	0	0	0	0	(0)
31050	0	0	255	255	170	(680)
31055	170	170	255	255	0	(850)
31060	252	254	167	171	179	(1023)
31065	255	227	127	127	227	(963)
31070	255	179	171	167	254	(1026)
31075	252	63	127	229	213	(884)
31080	205	255	199	254	254	(1167)
31085	199	255	205	213	229	(1101)
31090	127	63	99	127	99	(515)
31095	127	99	127	99	127	(579)
31100	198	254	198	254	198	(1102)
31105	254	198	254	0	255	(961)
31110	255	170	170	170	255	(1020)
31115	255	7	31	61	125	(479)
31120	124	252	255	255	224	(1110)
31125	240	220	222	38	31	(751)
31130	255	255	255	255	255	(1275)
31135	127	127	63	31	7	(355)
31140	192	255	255	254	254	(1210)
31145	252	248	224	7	31	(762)
31150	60	125	125	252	255	(817)
31155	255	224	248	28	222	(977)
31160	222	30	248	224	255	(979)
31165	255	255	127	127	63	(827)
31170	31	7	192	224	248	(702)
31175	254	254	252	248	224	(1232)
31180	7	31	60	124	125	(347)
31185	253	255	255	224	248	(1235)
31190	28	30	220	216	240	(734)
31195	224	255	255	255	127	(1116)
31200	127	63	31	7	192	(420)
31205	224	240	248	252	254	(1218)
31210	248	224	48	72	196	(788)
31215	196	15	31	145	153	(540)
31220	12	16	35	35	240	(340)
31225	248	137	201	153	249	(988)
31230	17	31	2	4	8	(62)
31235	128	201	207	136	240	(912)
31240	64	32	16	30	112	(254)
31245	104	4	4	15	31	(158)
31250	17	21	14	22	32	(106)
31255	32	248	248	136	160	(824)
31260	21	245	17	31	2	(316)
31265	4	4	60	168	175	(411)
31270	136	248	64	32	32	(512)
31275	60	48	56	4	4	(172)
31280	15	31	17	19	12	(94)
31285	28	32	32	240	248	(580)
31290	136	152	19	243	145	(695)
31295	159	130	2	2	30	(323)
31300	152	159	137	249	65	(762)
31305	64	64	120	21	42	(311)
31310	127	255	195	243	243	(1063)
31315	243	85	170	254	255	(1007)
31320	195	207	207	207	195	(1011)
31325	255	231	240	248	255	(1229)
31330	255	127	195	255	231	(1063)
31335	15	31	255	255	254	(810)
31340	42	42	127	255	195	(661)
31345	219	219	219	170	170	(997)
31350	254	255	195	219	219	(1142)
31355	219	195	255	255	224	(1148)
31360	224	255	255	127	195	(1056)
31365	255	255	7	7	255	(779)
31370	255	254	85	42	127	(763)
31375	255	195	207	207	207	(1071)
31380	84	170	254	255	195	(958)
31385	243	243	243	195	255	(1179)
31390	255	248	240	231	255	(1229)
31395	127	195	255	255	31	(863)
31400	15	231	255	254	64	(819)
31405	160	144	203	167	151	(825)
31410	143	135	2	5	9	(294)
31415	211	229	169	177	161	(947)
31420	255	143	151	167	203	(919)
31425	144	160	64	191	177	(736)
31430	169	229	211	9	5	(623)
31435	2	0	32	80	75	(189)
31440	103	87	79	71	0	(340)
31445	4	10	210	230	106	(560)
31450	114	98	127	79	87	(505)
31455	103	75	80	32	0	(290)
31460	128	114	106	230	210	(788)
31465	10	4	0	0	0	(14)
31470	15	43	39	54	48	(198)
31475	28	0	0	0	[illegible]	[illegible]
31480	228	236	244	228	[illegible]	(908)
31485	46	54	39	43	16	(198)
31490	0	0	252	244	236	(732)
31495	228	212	8	0	0	(448)
31500	63	127	234	213	255	(892)
31505	0	127	240	252	254	(873)
31510	171	85	255	0	254	(765)
31515	15	255	127	0	255	(652)
31520	213	234	127	63	255	(892)
31525	254	0	255	85	171	(765)
31530	254	252	0	63	127	(696)
31535	213	170	255	127	255	(1020)
31540	0	252	254	87	171	(764)
31545	255	254	255	240	127	(1131)
31550	255	170	213	127	63	(828)
31555	0	15	254	255	171	(695)
31560	87	254	252	0	0	(593)
31565	0	0	63	127	234	(424)
31570	213	255	0	0	0	(468)

31575	252	254	171	85	255	(1017)
31580	255	213	234	127	63	(892)
31585	0	0	0	255	85	(340)
31590	171	254	252	0	0	(677)
31595	0	3	15	31	63	(112)
31600	126	123	254	244	192	(939)
31605	240	248	252	126	222	(1088)
31610	127	47	244	254	123	(795)
31615	126	63	31	15	3	(238)
31620	47	127	222	126	252	(774)
31625	240	240	192	3	15	(690)
31630	31	62	127	122	252	(594)
31635	232	192	240	248	124	(1036)
31640	254	94	63	23	232	(666)
31645	252	122	127	62	31	(594)
31650	15	3	23	63	94	(198)
31655	254	124	248	240	192	(1058)
31660	3	15	30	63	116	(227)
31665	120	240	208	192	240	(1000)
31670	120	252	46	30	15	(463)
31675	11	208	240	120	116	(695)
31680	63	30	15	3	11	(122)
31685	15	30	46	252	120	(463)
31690	240	192	3	15	31	(481)
31695	63	127	127	255	255	(827)
31700	192	240	232	244	242	(1150)
31705	250	249	249	255	255	(1258)
31710	127	127	63	31	15	(363)
31715	3	249	249	250	242	(993)
31720	244	232	240	192	3	(911)
31725	14	28	56	120	112	(330)
31730	240	240	192	112	56	(840)
31735	28	30	14	15	15	(102)
31740	240	240	112	120	56	(768)
31745	28	14	3	15	15	(75)
31750	14	30	28	56	112	(240)
31755	192	3	15	23	47	(280)
31760	79	95	159	159	192	(684)
31765	240	240	252	254	254	(1240)
31770	255	255	159	159	95	(923)
31775	79	47	23	15	3	(167)
31780	255	255	254	254	252	(1270)
31785	240	240	192	3	15	(690)
31790	31	63	127	127	255	(603)
31795	255	192	240	248	252	(1187)
31800	254	254	255	255	255	(1273)
31805	255	127	127	63	31	(603)
31810	15	3	255	255	254	(782)
31815	254	252	248	240	192	(1186)
31820	3	12	16	39	95	(165)
31825	127	255	255	192	48	(877)
31830	8	228	250	254	255	(995)
31835	255	255	255	127	127	(1019)
31840	63	31	15	3	255	(367)
31845	255	254	254	252	248	(1263)
31850	240	192	3	15	31	(481)
31855	63	120	96	192	128	(599)
31860	192	240	248	252	30	(962)
31865	6	3	1	128	192	(330)
31870	96	120	63	31	15	(325)
31875	3	1	3	6	30	(43)
31880	252	248	240	192	3	(935)
31885	15	31	63	127	127	(363)
31890	255	255	192	240	248	(1190)
31895	252	254	254	255	255	(1270)
31900	255	255	127	95	39	(771)
31905	16	12	3	255	255	(541)
31910	254	250	228	8	48	(788)
31915	192	3	15	31	63	(304)
31920	127	127	255	255	192	(956)
31925	240	248	252	254	254	(1248)
31930	255	255	255	255	127	(1147)
31935	127	63	31	15	3	(239)
31940	255	255	254	254	252	(1270)
31945	248	240	192	60	126	(866)
31950	219	219	255	219	102	(1014)
31955	60	36	60	36	60	(252)
31960	36	60	165	255	0	(516)
31965	0	60	126	219	255	(660)
31970	219	231	126	60	36	(672)
31975	60	36	60	165	255	(576)
31980	0	0	0	0	60	(60)
31985	126	219	255	219	231	(1050)
31990	126	60	36	60	165	(447)
31995	255	227	227	227	227	(1163)
32000	227	227	227	227	227	(1135)
32005	227	227	227	227	227	(1135)
32010	227	227	227	227	227	(1135)
32015	227	227	227	227	227	(1135)
32020	227	227	227	227	227	(1135)
32025	227	227	227	227	202	(1110)
32030	202	202	202	202	202	(1010)
32035	202	202	202	202	202	(1010)
32040	202	202	202	202	202	(1010)
32045	202	202	202	202	202	(1010)
32050	202	202	202	202	202	(1010)
32055	202	202	202	202	227	(1035)
32060	227	202	245	245	245	(1164)
32065	238	238	238	202	245	(1161)
32070	245	245	238	202	238	(1168)
32075	245	245	245	202	238	(1175)
32080	238	238	245	245	245	(1211)
32085	238	238	238	202	245	(1161)
32090	202	227	227	202	202	(1060)
32095	245	202	238	202	238	(1125)
32100	202	202	245	202	238	(1089)
32105	202	238	245	202	202	(1089)
32110	202	202	238	202	245	(1089)
32115	202	245	238	202	238	(1125)
32120	202	245	202	227	227	(1103)
32125	202	202	245	202	238	(1089)
32130	202	238	202	202	245	(1089)
32135	202	238	202	238	245	(1125)
32140	202	202	202	202	238	(1046)
32145	202	245	202	245	238	(1132)
32150	202	238	202	245	202	(1089)
32155	227	227	202	202	245	(1103)
32160	202	238	202	238	202	(1082)
32165	202	245	202	238	238	(1125)
32170	238	245	245	245	202	(1175)
32175	202	238	202	245	202	(1089)
32180	245	238	238	238	202	(1161)
32185	245	202	227	227	202	(1103)
32190	202	245	202	238	202	(1089)
32195	238	202	202	245	202	(1089)
32200	238	202	238	245	202	(1125)
32205	202	202	202	238	202	(1046)
32210	245	202	245	238	202	(1132)
32215	202	202	245	202	227	(1078)
32220	227	202	202	245	202	(1078)
32225	238	202	238	202	202	(1082)
32230	245	202	238	202	238	(1125)
32235	245	202	202	202	202	(1053)
32240	238	202	245	202	245	(1132)
32245	238	202	202	202	202	(1046)
32250	202	227	227	202	202	(1060)
32255	245	202	238	238	238	(1161)
32260	202	202	245	202	238	(1089)
32265	202	238	245	245	245	(1175)
32270	202	202	238	202	245	(1089)
32275	245	245	238	202	202	(1132)
32280	202	245	202	227	227	(1103)
32285	202	202	202	202	202	(1010)
32290	202	202	202	202	202	(1010)
32295	202	202	202	202	202	(1010)
32300	202	202	202	202	202	(1010)
32305	202	202	202	202	202	(1010)
32310	202	202	202	202	202	(1010)
32315	227	227	227	227	227	(1135)
32320	227	227	227	227	227	(1135)
32325	227	227	227	227	227	(1135)
32330	227	227	227	227	227	(1135)
32335	227	227	227	227	227	(1135)
32340	227	227	227	227	227	(1135)
32345	227	227	227	197	229	(1107)
32350	213	245	221	229	217	(1125)
32355	197	229	213	205	102	(946)
32360	110	205	220	111	205	(851)
32365	82	109	205	173	110	(679)
32370	205	19	112	205	131	(672)
32375	109	42	25	91	38	(305)
32380	0	17	4	0	205	(226)
32385	71	106	209	225	193	(804)
32390	217	221	225	241	209	(1113)
32395	225	193	251	201	0	(870)

■

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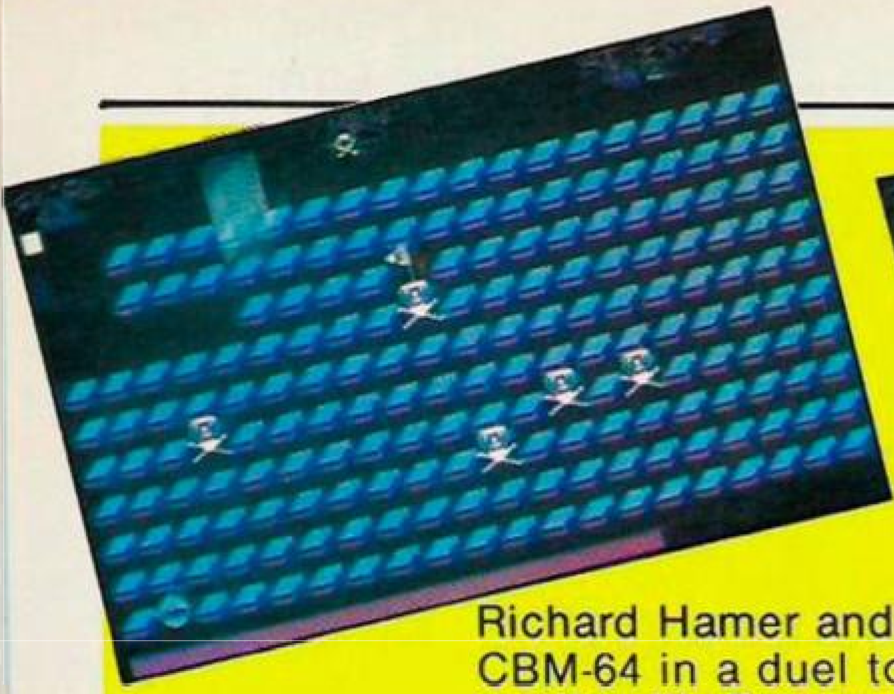
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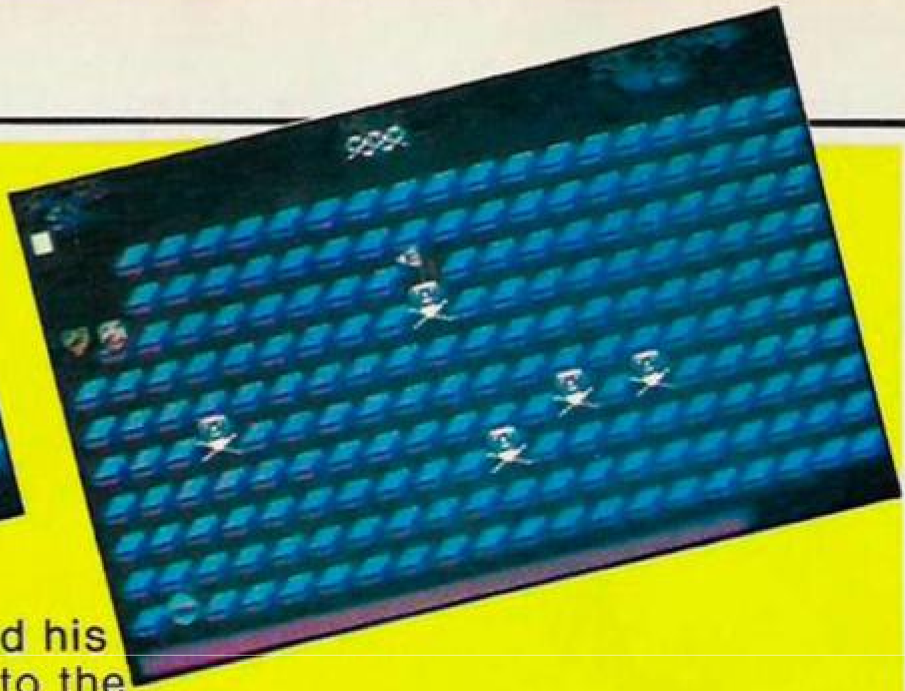
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Richard Hamer and his CBM-64 in a duel to the death with Gruesome Gandy.

DEATH TR

THERE ARE six parts to Deathtrap 64, each of which must be typed in and saved — separately from each other. The first is a short program, which relocates the start of Basic to make room for the graphical data. The second is the data for the graphics themselves. The third is the data for the continuous music/IRQ routine. My thanks must go to Paul Marzetti for his 64 Bar Blues articles, published in the October 1984 issue of *Your Computer*.

The fourth part is the row scrolling routine, the fifth part the moving routine — this repositions the sprites and works out whether they should be on the right or left-hand side of the screen. The sixth part is the program itself. When you have typed all of this in, load the first part and run it — loading will continue automatically. When it has finished loading you will be presented with the options page.

Pressing 1 will start the game. Pressing 2 increases the time — decrease rate — the higher this is — maximum 4 — the slower the time runs out. Pressing 3 will increase the initial skill level which can be from 1 to 9 — the higher this number is, the harder the game is. Level 1 has one chaser, level 2 two, and so on, up to level 7, which has, like level 6, the maximum of six chasers. Pressing four will change the chasers' IQ: I = Intelligent, D = Dunce.

You can use either a joystick in port 2, or by keys which are as follows:

Left — 2
Right — X
Up — I
Down — J

Scroll row left — Shift and 2 together — or fire button and left with the joystick.
Scroll row right — Shift and X — or fire button and right with joystick.
Warp — Function key F1. There is no joystick equivalent.

Now for the game itself; You, Messy-Martin, must cross the dreaded squares which are inhabited by the even more dreaded Gruesome Gandy. Once you leave a square, it disappears, leaving a hole for you to fall through — if you do so you lose a life. You can cross from the far left side of the screen to the right side and vice versa — if you do this, the square you have

Program 1.

```
0 POKE198,7:POKE631,76:POKE632,111:POKE633,13:POKE634,82:POKE635,117:POKE636,13
10 POKE44,40:POKE40*256,0:CLR:NEW
```

Program 2.

```
0 DATA 15, 240, 0, 53, 92, 0, 213, 92, 0, 221, 119
1 DATA 0, 213, 87, 0, 213, 87, 0, 215, 87, 0, 221
2 DATA 87, 0, 221, 119, 0, 55, 220, 0, 53, 92, 0
3 DATA 13, 112, 0, 3, 192, 0, 0, 0, 0, 0, 0
4 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
5 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0
6 DATA63, 252, 0,42,168, 0, 46, 184, 0, 42,168
7 DATA 0, 42, 232, 0, 43, 232, 0, 47, 168, 0, 58
8 DATA172,,58,172, 0, 14,176, 0, 14, 176, 0
9 DATA 3, 192, 0, 3, 192, 0, 0, 0, 0, 0, 0
10 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
11 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0
12 DATA 0, 85, 42, 1, 85, 34, 1, 85, 40, 5, 85
13 DATA 98, 5, 245, 104, 21, 245, 64, 85, 85, 98, 85
14 DATA 85, 98, 5, 85, 98, 5, 125, 106, 7, 245, 64
15 DATA 7, 245, 106, 5, 85, 72, 5, 85, 72, 5, 85
16 DATA 0, 1, 85, 0, 1, 85, 0, 0, 84, 0, 1
17 DATA 84, 0, 1, 4, 0, 5, 20, 0, 0
18 DATA 1, 80, 170, 5, 84, 170, 18, 132, 130, 27, 228
19 DATA 130, 91, 233, 0, 82, 137, 42, 85, 86, 34, 21
20 DATA 85, 106, 21, 85, 98, 21, 85, 64, 21, 85, 106
21 DATA 31, 245, 98, 31, 245, 106, 5, 245, 104, 5, 85
22 DATA 98, 1, 85, 0, 0, 84, 42, 0, 80, 0, 1
23 DATA 84, 0, 1, 4, 0, 5, 20, 0, 0
24 DATA 15, 255, 194, 13, 85, 114, 53, 85, 122, 53, 86
25 DATA 90, 213, 90, 152, 213, 154, 184, 213, 170, 183, 214
26 DATA 169, 183, 214, 169, 183, 154, 101, 87, 154, 101, 87
27 DATA 170, 85, 87, 170, 85, 92, 169, 85, 92, 169, 85
28 DATA 92, 229, 85, 92, 37, 85, 112, 13, 85, 112, 3
29 DATA 85, 192, 0, 213, 192, 0, 255, 0, 0
30 DATA 60, 66, 165, 129, 102, 24, 36, 195, 0, 24, 36
31 DATA 36, 126, 66, 129, 0, 0, 192, 176, 136, 240, 136
32 DATA 176, 192, 0, 3, 12, 48, 64, 48, 12, 3
33 DATA 0, 192, 160, 144, 136, 144, 160, 192, 0, 224, 152
34 DATA 128, 224, 128, 152, 224, 0, 224, 152, 128, 224, 152
35 DATA 128, 128, 0, 30, 96, 128, 159, 66, 50, 14
36 DATA 68, 68, 130, 130, 254, 130, 130, 68, 60, 219, 24
37 DATA 24, 24, 24, 219, 60, 7, 56, 200, 0, 4, 2
38 DATA 2, 60, 0, 72, 72, 80, 112, 76, 67, 64
39 DATA 32, 32, 32, 64, 64, 67, 140, 240, 130, 198, 202
40 DATA 170, 146, 129, 129, 129, 129, 193, 162, 162, 146, 146
41 DATA 142, 130, 24, 36, 66, 129, 129, 66, 36, 24
42 DATA 224, 152, 132, 130, 254, 128, 128, 128, 24, 36, 66
43 DATA 145, 137, 70, 38, 25, 252, 130, 129, 130, 252, 176
44 DATA 140, 131, 3, 12, 48, 192, 63, 12, 48, 192
45 DATA 15, 48, 200, 0, 4, 4, 2, 1, 66, 66, 66
46 DATA 66, 66, 66, 36, 24, 32, 33, 66, 68, 136, 144
47 DATA 160, 192, 129, 129, 145, 145, 169, 169, 165, 66
48 DATA 65, 66, 36, 40, 16, 48, 72, 136, 33, 18, 10
49 DATA 4, 8, 16, 16, 32, 192, 48, 12, 3, 252, 48
50 DATA 12, 3, 0, 0, 0, 0, 0, 0, 0, 0
51 DATA,,,,,,3,7,,,,,,,,,255,255,15,31,63,127,255,128,128,255,
   255,253,249,242,228,
40
52 DATA48,224
54 DATA 0, 0, 0, 0, 0, 0, 0, 0, 3, 15, 53
55 DATA 243, 243, 53, 15, 3, 3, 15, 49, 245, 241, 55
56 DATA 15, 3, 3, 15, 49, 245, 241, 53, 15, 3
57 DATA 3, 15, 49, 251, 251, 49, 15, 3, 204, 202, 204
58 DATA 202, 204, 192, 202, 202, 255, 255, 195, 219, 219, 195
59 DATA 255, 255, 202, 206, 192, 206, 196, 196, 196, 192
60 DATA 31, 32, 44, 33, 41, 36, 19, 8, 248, 4, 52
61 DATA 132, 148, 36, 200, 16, 196, 55, 15, 3, 3, 12
62 DATA 48, 192, 35, 236, 240, 192, 192, 48, 12, 3
63 DATA 0, 0, 3, 15, 31, 63, 127, 127, 126, 129, 197
64 DATA 242, 248, 252, 254, 254, 253, 196, 109, 109, 63, 31
65 DATA 15, 3, 191, 163, 54, 182, 252, 248, 240, 192
66 DATA 24, 36, 70, 137, 145, 98, 36, 24, 8, 24, 40
67 DATA 8, 16, 16, 16, 120, 24, 100, 130, 130, 6, 12
68 DATA 48, 127, 12, 52, 196, 12, 20, 36, 4, 124
69 DATA 32, 32, 68, 68, 136, 240, 30, 32, 15, 24, 96
70 DATA 124, 2, 1, 1, 62, 8, 16, 32, 96, 152, 68
71 DATA 40, 16, 6, 10, 18, 36, 12, 8, 8, 16
72 DATA 24, 36, 66, 36, 24, 36, 36, 24, 8, 20, 36
73 DATA 100, 20, 12, 4, 4
100 FORT=0TO4:FORM=0TO63:READA:POKE2048+M+T*64,A:NEXTM,T
101 FORT=0TO57:FORM=0TO7:READA:POKE8192+M+T*8,A:NEXTM,T
102 POKE198,6:POKE631,76:POKE632,111:POKE633,13:POKE634,82:
    POKE635,117:POKE636,1
3
```

just left is not destroyed. Your objective is to reach the bomb, collecting bonus flags on the way, so that you can defuse the bomb before its timer runs out, and it comes to get you.

If you run into Gruesome Gandy on the way your nose will immediately seize up and he will crush your head. All this is done behind a cloud.

If you do manage to defuse the bomb it will be replaced by another for you to defuse. After you have defused five bombs you move onto the bonus screen (qv).

While you guide Martin past Gandy, you must avoid the deadly Gandyish traps, the dreaded Ken-and-Shrimp bones. An added feature of this version is that you can — theoretically — scroll the row to your advantage. I say theoretically, because it takes quite a bit of practice. Remember, when scrolling, that squares are deadly, as are Ken-and-Shrimp bones to poor little Martin. Study the scrolling pattern — ie. have a practice on level 1 — so that you learn how to scroll without killing yourself. Helpful keys are:

F3 — Music on/off
F5 — Pause/Unpause
Shift F7 — Abort game and return to title screen.
Commodore £ — Stop game, return character set to normal, turn off sprites — I used it when debugging my program, you may find it useful.

If you find yourself stuck, you can press the warp button. But beware — it may transport you to your death, since Martin's warp facility has been malfunctioning ever since Gandy met him on a hot summer's day. Your warp machine can only work for a certain number of times per level — this is shown as a yellow bar at the top of the screen. Your time is the red bar at the bottom. Once this has run out, you are on your own until you complete that level.

When you have defused five bombs, you move onto the bonus screen, where you must try and get the flag — this is not always possible! Because sprites are used, you must aim towards the left of the flag — sometimes, you can lose your bonus because you are one pixel to the left.

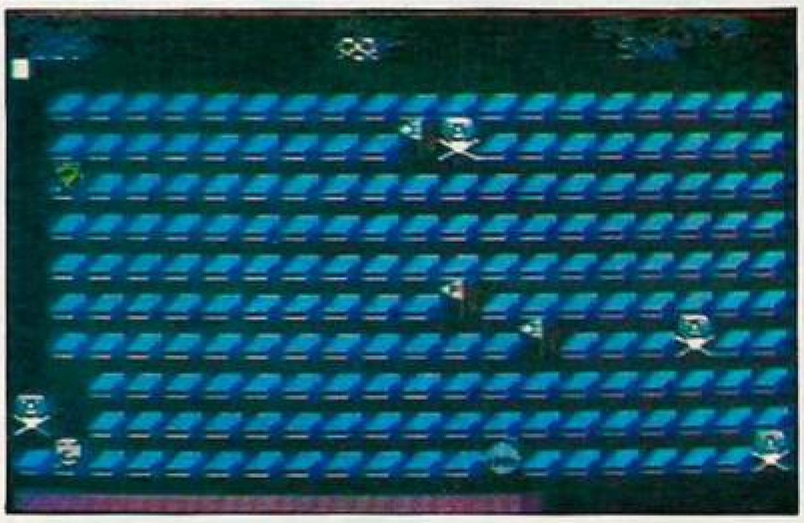
Press a key to start and press it once again to start your descent. The quicker you do it, and the higher the level, the bigger the bonus you will receive. After this screen, the skill level is incremented, and you go back to the first screen.

Finally, if you don't/can't type this program in, but would like a copy of it on tape, send a cheque/postal order for £2.50 made out to R. Hamer to: Deathtrap 64 Offer, 26 St. Barnabas Road, Emmer Green, Reading RG4 8RA.

(program 5 and 6 on page 79)

RAP 64





Program 3.

```
0 L=L+1:IFL=2THENLOAD
1 IFL=3THEN715
19 DATA173,238,2,240,3,76,49,234,206,239,2,208,248,173,240,2
20 DATA141,239,2,174,2,,189,48,192,201,255,240,70,141,1,212
30 DATA189,92,193,141,,212,189,136,194,141,0,212,189,180,195,141
40 DATA7,212,189,224,196,141,15,212,189,12,198,141,14,212,232,234
50 DATA142,2,,169,,141,4,212,141,11,212,141,18,212,173,241
60 DATA2,141,4,212,173,242,2,141,11,212,173,243,2,141,18,212
70 DATA76,49,234,169,,141,2,,76,69,199
80 FORD=51000TO51106:READA:POKED,A:NEXT
90 DIMHT(20),LT(20),HM(20),LM(20),HB(20),LB(20)
100 FORA=0TO20:READHT(A),LT(A):HM(A)=HT(A):LM(A)=LT(A):HB(A)=HT(A):LB(A)=LT(A):N
EXT
130 DATA,,14,24,16,195,18,209,11,48,9,104,21,31,22,96,25,30,28,49,33,135,31,165
140 DATA37,162,42,62,44,193,50,60,63,75,8,97,10,143,12,143,255,255
200 POKE49800,0:POKE50100,0:POKE50400,0:POKE50401,0:POKE50700,0:POKE50701,0
201 FORA=0TO123:READB:POKE49200+A,HT(B):POKE49500+A,LT(B):POKE49800+A,0
202 POKE50100+A,0:POKE50401+A,HB(B):POKE50701+A,LB(B):NEXT
203 POKE49924,0:POKE50224,0:POKE50524,0:POKE50525,0:POKE50824,0:POKE50825,0
204 FORA=124TO224:READB:POKE49200+A,HT(B):POKE49500+A,LT(B):POKE49800+A,HM(B)
205 POKE50100+A,HM(B):POKE50400+A,HB(B):POKE50700+A,LB(B):NEXT
300 DATA3,2,3,1,4,1,5,5,5,3,2,3,1,4,1,5,5,5
310 DATA3,6,7,6,7,3,6,3,6,2,3,1,4,1,5,5,5
311 DATA3,2,3,1,4,1,5,5,5,3,6,7,6,7,3,6,3,6,2,6,3,7,9,10,10,10
312 DATA10,11,10,8,6,8,2,2,2,10,11,10,8,6,8,2,2,2
313 DATA10,12,13,12,13,10,12,10,12,11,10,8,6,8,2,2,2
314 DATA10,11,10,8,6,8,2,2,2,10,12,13,12,13,10,12,10,12,11,12,10,13,15,16,16,16
315 DATA16,20,20
320 DATA,,17,17,17,18,19,2,2,2,1,1,1,1,1,1,4,19,1,19,19,19,19,19,19,19,19,17,17
321 DATA17,18,19,19,19,5,5,5,5,5,18,18,4,18,5,17,17,17,17,17,17,17,17,17,17
322 DATA18,19,2,2,2,1,1,1,1,1,1,4,19,1,19,19,19,19,19,19,19,19,17,17,18,19,19
323 DATA19,19,19,5,5,5,5,5,18,4,18,5,17,17,17,,,20,20
499 S=54272
500 POKES+24,31:POKES+22,128:POKES+23,244:POKES+5,0:POKES+6,240
505 POKES+12,85
530 POKES+13,133:POKES+19,10:POKES+20,197:POKE753,17:POKE754,65:POKES+18,8
540 POKE755,33:POKE752,0:POKE788,56:POKE789,199
600 POKE2,125:POKE51100,125
714 POKE750,1:LOAD
715 POKE198,6:POKE631,76:POKE632,111:POKE633,13:POKE634,82:POKE635,117:POKE636,1
3
```

Program 4.

```
0 DATAA9,FF,8D,20,CB,A0,4D,B1
10 DATAFB,C8,C8,91,FB,88,88,88
20 DATACC,20,CB,D0,F2,EA,EA,EA
30 DATAEA,EA,EA,EA,EA,EA,EA,18
40 DATAA9,08,E5,FC,30,3A,18,EA
50 DATAA9,D4,65,FC,4C,54,C8,A9
60 DATA0E,A0,00,91,FB,C8,91,FB
70 DATAA0,28,91,FB,C8,91,FB,A9
80 DATA1F,91,FD,A9,1E,88,91,FD
90 DATAA0,00,A9,1C,91,FD,C8,A9
100 DATA1D,91,FD,60,85,FC,4C,00
110 DATAC8,EA,EA,EA,EA,EA,EA,EA
120 DATAA9,D4,18,65,FE,85,FC,4C
130 DATA2F,C8,00,00,02,02,00,00
140 DATAA9,50,8D,20,CB,A0,02,B1
150 DATAFB,88,88,91,FB,C8,C8,C8
160 DATACC,20,CB,D0,F2,EA,EA,EA
170 DATAEA,EA,EA,EA,EA,EA,EA,18
180 DATAA9,08,E5,FC,30,3A,18,EA
190 DATAA9,D4,65,FC,4C,C4,C8,A9
200 DATA0E,A0,26,91,FB,C8,91,FB
210 DATAA0,4E,91,FB,C8,91,FB,A9
220 DATA1F,91,FD,A9,1E,88,91,FD
230 DATAA0,26,A9,1C,91,FD,C8,A9
240 DATA1D,91,FD,60,85,FC,4C,70
250 DATAC8,EA,EA,EA,EA,EA,EA,EA
260 DATAA9,D4,18,65,FE,85,FC,4C,9F,C8
500 FORT=0TO217:READA$:L$=LEFT$(A$,1):
    R$=RIGHT$(A$,1):L=ASC(L$):R=ASC(R$)
510 IFL>64THENL=L-55:GOTO530
520 L=L-48
530 IFR>64THENR=R-55:GOTO550
540 R=R-48
550 X=(L*16)+R:POKE51200+T,X:NEXT
1000 LOAD
```

DEATH TRAP 64

Program 5.

```
1 DATA 169, 20, 133, 253, 169, 205, 133, 254, 160, 0, 24, 177, 253
2 DATA 113, 251, 145, 251, 76, 112, 203, 234, 234, 234, 234, 208, 192
3 DATA 16, 208, 237, 96, 24, 152, 106, 170, 169, 0, 56, 42, 224
4 DATA 0, 240, 4, 202, 76, 120, 205, 13, 16, 208, 141, 16, 208
5 DATA 76, 57, 203, 24, 152, 106, 170, 169, 255, 42, 224, 0, 240
6 DATA 4, 202, 76, 94, 203, 45, 16, 208, 141, 16, 208, 76, 57
7 DATA 203, 201, 0, 208, 9, 169, 1, 209, 253, 208, 191, 76, 63
8 DATA 203, 201, 255, 208, 184, 169, 255, 209, 253, 208, 178, 76, 88
9 DATA 203, 96, 0, 0, 2, 2, 0, 0, 2, 2, 0, 0, 2
10 DATA 2, 0, 0, 2, 2, 0, 0, 2, 2, 0, 0, 2, 2
100 FORT=52001TO52130:READA:POKET,A:NEXT
105 POKE52600,24:POKE52601,76:POKE52602,70:POKE52603,203
110 POKE198,7:POKE631,76:POKE632,111:POKE633,13:POKE634,82:POKE635,117:POKE636,1
3
```

Program 6.

```
0 POKE53272,24:POKE750,0:POKE53280,0:POKE53281,0:SF=1:DR=1:C$="I"
1 LS$="Z":RS$="X":LL$="*":RR$="*":US$="I":DS$="J":WW$="■":V=53248:S=54272
3 DIMDX(16),DY(16)
4 FORT=1TO5:HS(T)=500:NEXT:H$(1)="OSV":H$(2)="RMU":H$(3)="HEC":H$(4)="DLK"
5 H$(5)="YLY":V=53248:S=54272
6 FORT=0TO7:POKE2368+T*3,PEEK(8544+T):POKE2369+T*3,PEEK(8552+T):POKE2370+T*3,0
7 POKE2383+T*3,PEEK(8560+T):POKE2384+T*3,PEEK(8568+T):POKE2385+T*3,0:NEXT:FORT=4
0TO62
8 POKE2368+T,0:NEXT :POKE650,255:FORT=9472TO9479:POKET,255:NEXT:Q=56320:DX=52500
:DY=DX+1
9 POKES-1000,24:POKE2,125:POKE51100,125:GOSUB10:POKEV+37,10:POKEV+21,0:POKEV+38,
0:GOTO19
10 PRINT"■■         COPYRIGHT 1985  BY R HAMER"
11 PRINT"■■■■  ■■■   ■    ■■■ ■ ■ ■■■ ■■■   ■   ■■■";
12 PRINT"■  ■ ■    ■ ■   ■  ■ ■  ■  ■ ■ ■  ■ ■ ■";
13 PRINT"■  ■ ■   ■   ■  ■  ■ ■  ■  ■ ■ ■   ■ ■ ■";
14 PRINT"■  ■ ■■  ■■■■■  ■  ■■■  ■  ■■■ ■■■■■ ■■■";
15 PRINT"■  ■ ■   ■   ■  ■  ■ ■  ■  ■■  ■   ■ ■"
16 PRINT"■  ■ ■   ■   ■  ■  ■ ■  ■  ■ ■ ■   ■ ■"
17 PRINT"■■■  ■■■ ■   ■  ■  ■ ■  ■  ■ ■ ■   ■ ■■64■"
18 PRINT"BY GANDY GRAPHICS FOR YOUR COMPUTER":RETURN
19 POKE51041,141:POKE51042,0:POKE51043,212:POKE51047,141:POKE51048,7:POKE51049,2
12
20 PRINT"■OPTIONS ■":PRINT"■1 START GAME■":PRINT"2 DECREASE RATE"DR"■   "
21 PRINT"■3 SKILL"SF"■   ":PRINT"■4 CHASER "C$"TTTTT"
22 FORT=1TO1000
25 GETA$:V=VAL(A$):IFV<1ORV>4THENNEXT:GOSUB10:GOTO50
26 ONVGOTO98,30,35,37
30 DR=DR+1:IFDR>4THENDR=1
31 PRINTSPC(15)DR"T":GOTO22
35 SF=SF+1:IFSF>9THENSF=1
36 PRINT"■■"SPC(7)SF"TTT":GOTO22
37 IFC$="I"THENC$="D":GOTO39
38 IFC$="D"THENC$="I"
39 PRINT"■■■■"SPC(9)C$"TTTTT":GOTO22
50 PRINT"■HIGH SCORES ■■":FORT=1TO5:PRINT,T"■■"HS(T),H$(T):PRINT:NEXT
51 FORT=1TO10000:NEXT:GOSUB10:GOTO20
98 V=53248:S=54272:FORT=V+40TOV+45:POKET,0:NEXT:POKE750,1:HS=HS(1):SC=0:ME=3:SK=
SF
99 FORT=51041TO51043:POKET,234:NEXT:FORT=51047TO51049:POKET,234:NEXT:POKE54279,0
:POKE54280,0
100 BO=0:POKE750,1:POKES+24,0:POKE51100,0:POKE53265,PEEK(53265)AND239
101 PRINT"■■SCORE            MEN           HI SCORE":PRINT"■ 0"TAB(30)HS"TT"
102 PRINTTAB(17);:FORT=1TOME:PRINT"@";:NEXT:PRINT
103 L=0:PRINT:FORT=1TO10:PRINT"■£]£]£]£]£]£]£]£]£]£]£]£]£]£]£]£]£]£]£]£]";
104 PRINT"~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~";:NEXT
105 FORT=0TOINT(RND(1)*10):X=(INT(RND(1)*20)*2)+(INT(RND(1)*10)*80)
106 POKEX+1144,33+INT(RND(1)*4)
107 POKEX+1145,37:POKEX+1184,32:POKEX+1185,39:POKEX+55416,13:POKEX+55417,0
108 POKEX+55457,0:NEXT:X=0
110 FORT=1TOSK*5:X=(INT(RND(1)*20)*2)+(INT(RND(1)*10)*80):IFX=0THENT=T-1:NEXT
111 POKEX+1144,40:POKEX+1145,41
112 POKEX+1184,42:POKEX+1185,43:POKEX+55416,1:POKEX+55417,1:POKEX+55456,1
113 POKEX+55457,1:NEXT:X=0
120 BX=(INT(RND(1)*20)*2):BY=(INT(RND(1)*10)*2):X=BX+BY*40
121 POKEX+1144,44:POKEX+1145,45
122 POKEX+1184,46:POKEX+1185,47:POKEX+55416,12:POKEX+55417,12:POKEX+55456,12
123 POKEX+55457,12:X=0
130 POKE2040,32:FORT=2041TO2046:POKET,33:NEXT:POKE2047,37
131 V=53248:FORT=VTOV+15:POKET,0:NEXT:POKEV+16,0:POKEV+29,0:POKEV+23,0:POKEV+28,
127
140 POKEV,24:POKEV+1,74
141 POKEV+21,255
149 SL=SK:IFSL>6THENSL=6
150 FORT=1TOSL:X=24+(INT(RND(1)*20)*16):Y=74+(INT(RND(1)*10)*16):IFX=0ORX=1THEN1
50
151 Z=2*T:IFX>255THENPOKEV+16,PEEK(V+16)OR2↑T:X=X-256
152 POKEV+Z,X:POKEV+Z+1,Y:IFPEEK(V+Z)=PEEK(V)ANDPEEK(V+Z+1)=PEEK(V+1)THENT=T-1
153 NEXT
160 FORT=1TO40-SK:POKE1983+T,160:POKE56255+T,2:NEXT:FORT=1TOSK:POKE55375+T,7
161 POKE1103+T,160:IFT>38THENWA=T:TT=40-SK:T=0:GOTO180
162 NEXT:WA=T-1:TT=40-SK
180 REM
199 POKE53265,PEEK(53265)OR16:POKE750,0:POKE2,0:POKE51100,0:FORT=1TO100:NEXT:POK
ES+24,31
200 IFHS<SCTHENHS=SC
201 R$="":PRINT"■■"SC,,,HS
260 IFR$<>""THEN389
300 FORT=0TO15:POKEDX+T,0:NEXT:IFC$="I"THEN310
302 FORT=1TOSL:EX=DX+T*2:EY=DY+T*2:XX=INT(RND(1)*4):IFXX=0THENPOKEEX,255
303 IFXX=1THENPOKEEX,1
304 IFXX=2THENPOKEEY,255
305 IFXX=3THENPOKEEY,1
306 GOTO320
310 XX=PEEK(V)-(((PEEK(V+16)AND1)=1)*256):FORT=1TOSL:EX=DX+T*2:EY=DY+T*2
311 Y=PEEK(V+1+T*2):YY=PEEK(V+1):IFY>YYTHENPOKEEY,255:GOTO320
312 X=PEEK(V+T*2)-(((PEEK(V+16)AND2↑T)=2↑T)*256)
313 IFX<XXTHENPOKEEX,1:GOTO320
314 IFX>XXTHENPOKEEX,255:GOTO320
315 IFY<YYTHENPOKEEY,1
320 PZ=2↑T:PY=PEEK(V+16)ANDPZ:C=PEEK(EY):IFC=255THENC=-1
321 D=PEEK(EX):IFD=255THEND=-1
322 P=PEEK(V+2*T):IF(P+D<24ANDPY=0)OR(P+D>72ANDPY=PZ)THENPOKEEX,0
323 R=PEEK(V+1+T*2):IFR+C<74ORR+C>218THENPOKEEY,0
328 NEXT
330 GETA$:Z=0
331 P2=31-(PEEK(Q)AND31)
332 IFA$=LS$ORP2=4THENPOKEDX,255:Z=-1
333 IFA$=RS$ORP2=8THENPOKEDX,1:Z=1
334 IFA$=US$ORP2=1THENZ=-40:POKEDY,255
335 IFA$=DS$ORP2=2THENZ=40:POKEDY,1
336 IFA$=LL$ORP2=20THENZ=-100:GOTO1100
337 IFA$=RR$ORP2=24THENZ=100:GOTO1100
338 IFZ<>0ORA$=""THEN350
339 IFA$=WW$THEN1000
340 IFA$="■"ANDPEEK(753)=0THENPOKE753,17:POKE755,33:GOTO342
341 IFA$="■"ANDPEEK(753)<>0THENPOKE753,0:POKE755,0
342 IFA$="■"THEN9
343 IFA$<>"■"THEN345
344 GETA$:IFA$<>"■"THEN344
345 IFA$="←"THENPOKE53272,21:POKEV+21,0:STOP
346 GOTO300
350 PY=PEEK(V+16)AND1:IFABS(Z)=40THEN355
352 P=PEEK(V)+Z:IF(P<24ANDPY=0)OR(P>72ANDPY=1)THENZ=0:POKEDX,0:GOTO1300
353 GOTO389
355 P=PEEK(V+1)+Z/40:IFP<74ORP>218THENZ=0:POKEDY,0
389 POKE251,0:POKE252,208
391 FORL=0TO15:SYS52001:NEXT
392 T=PEEK(V+30)
396 SS=((PEEK(V)-24)/8)+((PEEK(V+1)-74)*5)+1144:PV=PEEK(V+16)AND1:IFPY=1THENSS=S
S+32
397 T=PEEK(SS)
398 IFT=44THEN401
399 IF(PEEK(V+30)AND1)=1THEN700
401 O=0-PEEK(52500)*2:H=0-PEEK(52501)*80:IFO=-510THENO=2
402 IFH=-20400THENH=80
403 IFO=0ANDH=0THEN405
404 SR=SS+O+H:POKESR,32:POKESR+1,32:POKESR+40,32:POKESR+41,32:SC=SC+10
405 IFT=28THEN500
406 IFT=40ORT=32THEN700
407 IFT<>44THEN450
408 BO=BO+1
409 FORT=1984+TTTO1984STEP-1:POKES+7,46:POKES+8,253:POKET,32:SC=SC+21
410 IFHS<SCTHENHS=SC
411 PRINT"■■"SC,,,HS:POKES+7,0:POKES+8,0:NEXT
412 IF BO=5THEN4000
415 TT=40-SK
416 FORT=1TOTT:POKE1983+T,160:POKE56255+T,2:NEXT
417 X=1144+BX+BY*40:POKEX,28:POKEX+1,29:POKEX+40,30:POKEX+41,31:X=X+S:POKEX,14:P
OKEX+1,14
418 POKEX+40,14:POKEX+41,14
420 BX=(INT(RND(1)*20)*2):BY=(INT(RND(1)*10)*2):X=BX+BY*40
421 POKEX+1144,44:POKEX+1145,45
422 POKEX+1184,46:POKEX+1185,47:POKEX+55416,12:POKEX+55417,12:POKEX+55456,12
423 POKEX+55457,12:X=0
425 GOTO200
450 FORT=1TO125STEP5:POKES+7,45:POKES+8,215:SC=SC+5:IFSC>HSTHENHS=SC
451 PRINT"■■"SC,,,HS:POKES+7,0:POKES+8,0:NEXT
455 X=SS:POKEX,28:POKEX+1,29:POKEX+40,30:POKEX+41,31:X=X+S:POKEX,14:POKEX+1,14
456 POKEX+40,14:POKEX+41,14
460 GOTO200
500 POKEV+16,PEEK(V+16)AND127:TT=TT-(1/DR):POKETT+1985,32:IFTT>=0THEN200
509 POKEV+28,127:POKEV+46,12
510 POKEV+21,255:POKEV+14,0:POKEV+15,0:POKE2047,37:X=1144+BX+BY*40:POKEX,32:POKE
X+1,32
511 BX=24+BX*8:BY=74+BY*8:BZ=BX:IFBX>255THENBX=BX-256:POKEV+16,PEEK(V+16)OR128
515 POKEX+40,32:POKEX+41,32:POKEV+14,BX:POKEV+15,BY:X=PEEK(V):PP=12
516 Y=PEEK(V+1):IF(PEEK(V+16)AND1)=1THENX=X+256
519 PP=PP-.05:IFPP>=1THENPOKE752,PP
520 IFBZ<XTHENBX=BX+2:IFBX=256THENPOKEV+16,PEEK(V+16)OR128:POKEV+14,0:BX=0
521 IFBZ>XTHENBX=BX-2:IFBX=-2THENPOKEV+16,PEEK(V+16)AND127:POKEV+14,254:BX=254
522 IFBY<YTHENBY=BY+2
523 IFBY>YTHENBY=BY-2
524 BZ=BX:IF(PEEK(V+16)AND128)=128THENBZ=BX+256
525 POKES+7,255:POKES+8,50:POKEV+15,BY:POKEV+14,BX:POKES+8,0:IFBZ<>XORBY<>YTHEN5
19
526 POKES+7,0
530 FORT=1TO35:G=53265:POKEG,(PEEK(G)AND248)+INT(RND(1)*8)
531 POKEG+5,(PEEK(G+5)AND248)+INT(RND(1)*8):NEXT:POKEG,(PEEK(G)AND248)+3
532 POKEG+5,(PEEK(G+5)AND248)
535 POKE2047,36:POKEV+37,11:POKEV+38,15:POKEV+46,7:POKEV+21,128:POKEV+28,255:FOR
T=BYTO0STEP-1
536 POKEV+15,T:NEXT:POKEV+21,255:POKEV+38,0:POKEV+37,10:ME=ME-1:IFME=0THEN2000
540 FORT=1TO40-SK:POKE1983+T,160:POKE56255+T,2:NEXT
541 TT=40-SK
549 POKE1081+ME,32
550 BX=(INT(RND(1)*20)*2):BY=(INT(RND(1)*10)*2):X=BX+BY*40
551 POKEX+1144,44:POKEX+1145,45
552 POKEX+1184,46:POKEX+1185,47:POKEX+55416,12:POKEX+55417,12:POKEX+55456,12
553 POKEX+55457,12:X=0
554 POKE752,10:GOTO200
700 POKE2047,36:POKEV+37,11:POKEV+38,15:POKEV+46,7:POKEV+21,128:POKEV+28,255
701 POKEV+14,PEEK(V):POKEV+16,PEEK(V+16)OR((PEEK(V+16)AND1)*128):FORT=PEEK(V+1)T
O0STEP-1
702 POKEV+15,T:NEXT:POKEV+21,255:POKEV+38,0:POKEV+37,10:ME=ME-1:IFME=0THEN2000
703 POKE1081+ME,32
704 POKESS,28:POKESS+1,29:POKESS+40,30:POKESS+41,31:SS=SS+S
705 POKESS,14:POKESS+1,14:POKESS+40,14:POKESS+41,14
999 GOTO200
1000 IFWA=0THEN260
1001 POKE1103+WA,32:WA=WA-1:U=INT(RND(1)*20)*16:T=INT(RND(1)*10)*16:POKEV+1,0
1002 U=U+24:T=T+74:POKEV+16,PEEK(V+16)AND254:IFU>255THENU=U-256:POKEV+16,PEEK(V+
16)OR1
1003 FORL=1TO2:FORM=0TO15:POKE53280,M:POKE54279,46:POKE54280,253:POKE54279,0
1004 POKE54280,0:NEXTM,L:POKE53280,0:POKEV,U:POKEV+1,T:GOTO260
1100 X=1144+((PEEK(V+1)-74)*5):Y=INT(X/256):XX=X-Y*256:POKE251,XX:POKE253,XX
1101 YY=X:ZZ=YY:YY=YY+38:IFZ<0THENYY=YY-38:ZZ=ZZ+38
1102 ZX=PEEK(YY)
1103 CC=0:IF1144+BY*40=XTHENCC=1
1105 POKE252,Y:POKE254,Y:IFZ<0THENSYS51312:IFCCTHENBX=BX-2
1110 IFZ>0THENSYS51200:IFCCTHENBX=BX+2
1120 IFZX<>40ANDZX<>44THEN389
1121 POKEZZ,ZX:POKEZZ+1,ZX+1:POKEZZ+40,ZX+2:POKEZZ+41,ZX+3
1122 ZZ=ZZ+S:IFZX=40THENPOKEZZ,1:POKEZZ+1,1:POKEZZ+40,1:POKEZZ+41,1:GOTO389
1123 POKEZZ,12:POKEZZ+1,12:POKEZZ+40,12:POKEZZ+41,12:IFZ<0THENBX=38
1124 IFZ>0THENBX=0
1125 POKE52500,0:POKE52501,0:GOTO389
1300 P=PEEK(V+16)AND1:IFP=1THENPOKEV+16,PEEK(V+16)AND254:POKEV,24:GOTO1302
1301 POKEV+16,PEEK(V+16)OR1:POKEV,72
1302 POKE52500,0:POKE52501,0:GOTO389
1999 S=54272:V=53248:SC=1500:W$=" ":R$="X":L$="Z"
2000 POKE752,10:POKE2,125:POKE51100,125:PRINT"■":POKEV+21,0:POKES-1000,21
2010 FORT=1TO20:POKES+7,255:POKES+8,50:PRINT,"■GAME OVER":POKES+7,0:POKES+8,0:NE
XT
2015 IFSC<HS(5)THEN9
2020 FORT=5TO1STEP-1:IFHS(T)<SCTHENNEXT
2025 T=T+1:FORL=5TOT+1STEP-1:HS(L)=HS(L-1):H$(L)=H$(L-1):NEXT
2030 PRINT"■":O$="■■■■■■■■■■■■■":B$="ABCDEFGHIJKLMNOPQRSTUVWXYZ RUB END SPACE"
2033 PRINTO$TAB(19)"■■■■■■":D=0
2035 B$=B$+B$:PRINTO$MID$(B$,1,40):X=1
2039 N$=""
2040 GETA$:Z=0:PRINT"■■■■■■■■■■■■■■■"N$"    "
2041 Q=56320:P=PEEK(Q):P1=PEEK(Q+1):P2=31-(PAND31):P3=31-(P1AND31)
2042 IFA$=LS$ORP2=4ORP3=4THENZ=-1
2043 IFA$=RS$ORP2=8ORP3=8THENZ=1
2044 IFA$=WW$ORP2=16ORP3=16THENZ=40
2045 IFZ=40THEN2100
2050 X=X+Z:IFX=0THENX=41
2055 IFX=42THENX=2
2060 PRINTO$MID$(B$,X,40)
2070 GOTO2040
2100 CC=X:IFCC>40THENCC=CC-40
2104 CC=CC+19:IFCC>40THENCC=CC-40
2105 IFCC>26THEN2140
2110 N$=N$+MID$(B$,CC,1):IFLEN(N$)<>4THEN2040
2120 N$=LEFT$(N$,3):GOTO2040
2140 IFCC>26ANDCC<32ANDLEN(N$)THENN$=LEFT$(N$,LEN(N$)-1):GOTO2040
2145 IFCC>31ANDCC<36THENH$(T)=N$:HS(T)=SC:GOTO9
2150 N$=N$+" ":IFLEN(N$)<>4THEN2040
2155 GOTO2120
4000 POKEV+21,1:POKEV,0:POKEV+16,0:POKEV+1,74
4010 PRINT"■■■■■■■■■■■■■■■■■■■■■■■■■()()()()()()()()()()()()()()()()()()()()()";
4011 PRINT"■+■+■+■+■+■+■+■+■+■+■+■+■+■+■+■+■+■+■+■+TTT"
4013 X=INT(RND(1)*15)*2:PRINTTAB(X)" ■■ ■■■■ ■■■■ ■■ ■"
4016 GETA$:IFA$<>""THEN4016
4017 GETA$:IFA$=""THEN4017
4018 TI$="000000"
4020 FORT=24TO255:POKEV,T:GETA$:IFA$<>""THEN4060
4021 NEXT:FORT=PEEK(V+1)TOPEEK(V+1)+8:POKEV+1,T:NEXT
4022 FORT=255TO24STEP-1:POKEV,T:GETA$:IFA$<>""THEN4060
4023 NEXT:FORT=PEEK(V+1)TOPEEK(V+1)+8:POKEV+1,T:NEXT:IFT<229THEN4020
4024 P=1024+PEEK(V)/8+PEEK(V+1)*5:XX=PEEK(P):IFXX<>39THEN4090
4030 GOTO4063
4060 FORT=PEEK(V+1)TO229:POKEV+1,T:NEXT
4062 POKEV+21,0:P=1984+(PEEK(V)-24)/8:XX=PEEK(P):IFXX<>39ORXX=32THEN4090
4063 VV=59-VAL(TI$):PRINT"■WELL DONE":PRINT"■BONUS"VV*SK*10:SC=SC+VV*SK*10
4064 FORT=1TO5000:NEXT:GOTO4100
4090 PRINT"■BAD LUCK YOU MISSED":FORT=1TO3000:NEXT
4100 SK=SK+1:GOTO100
9999 GOTO200
```

■



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Listing 1.

```
  4 LOAD ""CODE : CLS
  5 CLS : REM **WAVES*BY-TIM*CL
OSS**
  6 POKE 65500,0: POKE 65501,12
8
  7 PRINT "PRESS L TO LOAD FR
AMES": PRINT : PRINT "      ANY
 OTHER KEY TO CONTINUE"
  8 IF INKEY$="L" THEN GO TO 50
90
  9 IF INKEY$="" THEN GO TO 8
 10 CLS : PLOT 127,0: DRAW 0,17
5: PLOT 0,87: DRAW 255,0
 20 DIM L(127): DIM H(127): DIM
Q(127): DIM U(127)
 25 DIM F(127): DIM O(127)
 30 LET A=43
 35 LET D=-1
 40 FOR T=1 TO 4
 50 FOR G=1 TO 127
 60 IF INKEY$="9" THEN PLOT G+D
,A: GO TO 100
 65 IF INKEY$="0" AND T=2 THEN
FOR G=1 TO 127: LET H(G)=L(G)+88
: PLOT G+128,H(G): NEXT G: GO TO
 116
 66 IF INKEY$="0" AND T=4 THEN
FOR G=1 TO 127: LET U(G)=Q(G)+88
: PLOT G+128,U(G): NEXT G: GO TO
 116
 70 IF INKEY$="8" THEN LET A=A+
1: PLOT G+D,A: GO TO 100
 75 IF INKEY$="5" THEN LET A=A-
1: PLOT G+D,A: GO TO 100
 80 IF INKEY$="7" THEN LET A=A+
.5: PLOT G+D,A: GO TO 100
 90 IF INKEY$="6" THEN LET A=A-
.5: PLOT G+D,A: GO TO 100
 91 IF INKEY$="1" THEN INPUT "S
TARTING DEGREE ? ";P: GO TO 1000
 95 GO TO 60
100 IF T=1 THEN LET L(G)=A: GO
TO 115
101 IF T=2 THEN LET H(G)=A: GO
TO 115
102 IF T=3 THEN LET Q(G)=A: GO
TO 115
110 LET U(G)=A
115 NEXT G
116 IF T=2 THEN CLS : PLOT 127,
0: DRAW 0,175: PLOT 0,87: DRAW 2
55,0: LET A=43: LET D=-1
117 IF T=1 THEN LET A=131: LET
D=127
118 IF T=3 THEN LET A=131: LET
D=127
130 NEXT T
140 OVER 1: PLOT 127,0: DRAW 0,
175: PLOT 0,87: DRAW 255,0: PLOT
 127,87: OVER 0
141 FOR G=1 TO 127: LET F(G)=(Q
(G)-L(G))/8: LET O(G)=(U(G)-H(G)
)/8: NEXT G
145 INPUT "SOUTH TO NORTH ? ";S
$
146 INPUT "WEST TO EAST ? ";W$
147 CLS : FOR C=1 TO 9
148 FOR G=0 TO 126: PLOT G,L(G+
1): PLOT G+128,H(G+1): NEXT G
149 IF S$="" THEN GO TO 152
150 IF W$="" THEN GO TO 200
151 GO TO 2000
152 FOR A=0 TO 126 STEP 4
160 PLOT A,L(A+1)
170 DRAW 128,88+((H(A+1)-88)-L(
A+1))
180 NEXT A
190 GO TO 150
200 FOR T=0 TO 126
210 LET B=L(T+1): LET A=T
220 FOR G=1 TO 10
230 LET A=A+12.7: LET B=B+8.8
240 LET B=B+((H(T+1)-88)-L(T+1)
)/10
245 PLOT A,B
250 NEXT G
260 NEXT T
270 GO TO 2000
1010 FOR D=G-1 TO 126
1020 LET J=(SIN (P/360*2*PI)*40+
40)
1025 PLOT D+((T=2 OR T=4)*128),J
+((T=2 OR T=4)*88)
1026 IF T=1 THEN LET L(D+1)=J: G
O TO 1030
1027 IF T=2 THEN LET H(D+1)=J+88
: GO TO 1030
1028 IF T=3 THEN LET Q(D+1)=J: G
O TO 1030
1029 LET U(D+1)=J+88
1030 LET P=P+(360/127)
1040 NEXT D
1050 GO TO 115
2000 POKE 65532,PEEK (65498+C*2)
: POKE 65533,PEEK (65499+C*2): L
ET A=USR 65400
2001 POKE 65498+((C+1)*2),PEEK 6
5534: POKE 65499+((C+1)*2),PEEK
65535
2002 FOR G=1 TO 127
2010 LET L(G)=L(G)+F(G)
2015 LET H(G)=H(G)+O(G)
2020 NEXT G
2025 BEEP .5,10
2030 CLS
2040 NEXT C
4000 FOR G=1 TO 9
4010 POKE 65532,PEEK (65498+G*2)
: POKE 65533,PEEK (65499+G*2)
4020 LET A=USR 65450
4025 IF INKEY$="E" THEN GO TO 50
00
4030 NEXT G
4040 FOR G=9 TO 1 STEP -1
4050 POKE 65532,PEEK (65498+G*2)
: POKE 65533,PEEK (65499+G*2)
4060 LET A=USR 65450
4065 IF INKEY$="E" THEN GO TO 50
00
4070 NEXT G
4080 GO TO 4000
5000 CLS : PRINT "PRESS  S  TO S
AVE ALL FRAMES": PRINT : PRINT "
      R  TO RESTART PROGRAM": P
RINT : PRINT "      A  TO SEE A
NIMATION"
5010 IF INKEY$="A" THEN GO TO 40
00
5020 IF INKEY$="R" THEN GO TO 5
5030 IF INKEY$="S" THEN GO TO 50
50
5040 GO TO 5010
5050 INPUT "FILE NAME ";N$: IF L
EN (N$)>10 THEN GO TO 5050
5060 LET J=(PEEK 65518+256*PEEK
65519)-32768
5070 SAVE N$CODE 32768,J: SAVE "
DATA"CODE 65500,18: VERIFY ""COD
E : VERIFY ""CODE
5080 GO TO 5000
5090 INPUT "FILE NAME ? ";N$: IF
 LEN (N$)>10 THEN GO TO 5090
5100 LOAD N$CODE : LOAD ""CODE :
 GO TO 4000
```

Listing 2.

```
 10 DEF FN H(H$)=16*(CODE H$(1)
-48-(7 AND H$(1)>"9"))+CODE H$(2
)-48-(7 AND H$(2)>"9")
 20 FOR N=65400 TO 65480 STEP 8
 30 LET TOT=0
 40 PRINT N;": ";
 45 INPUT H$: PRINT H$;
 50 FOR B=1 TO LEN H$ STEP 2
 60 LET Z=FN H(H$): LET TOT=TOT
+Z
 70 POKE N+((B-1)/2),Z
 80 LET H$=H$(3 TO )
 90 NEXT B
100 PRINT " = ";: INPUT T: PRIN
T T
110 IF TOT<>T THEN PRINT "INPUT
 ERROR - TRY AGAIN": GO TO 30
120 NEXT N
```

Listing 3.

```
65400: 1100402AFCFF1A77 = 775
65408: 2313EB06003E00BE = 547
65416: C29BFF233E558CCA = 1179
65424: A2FF043EFFB8CA9B = 1279
65432: FF18EA78EB7723C3 = 1217
65440: 7EFF78EB772322FE = 1178
65448: FFC9110040 2AFCFF = 1086
65456: 7E1223133E5792DA = 711
65464: CFFF463E00B8CACB = 1183
65472: FF3E00121310F423 = 649
65480: C3B0FF23C3B0FFC9 = 1488
```

WAVES



Timothy Closs with a Spectrum program to make you sea-sick.

HOW MANY TIMES have you wanted to show off your new computer but have had nothing more to boast than a load of boring arcade games? Well now you can impress everyone with a stunning graphics display using Waves.

Waves allows a "net" pattern — see examples — to be transformed into another net pattern in a smooth, nine frame animation sequence. It is easy to use, but results can be stunning. When Run, Waves will display the message:

PRESS L TO LOAD FRAMES
ANY OTHER KEY TO CONTINUE

If you wish to load some frames from tape, press L and enter the name of the file to be loaded — otherwise press any other key.

A cross will then be displayed on the screen. The lower edge of your first pattern must now be drawn — see controls. When your edge is finished the cursor will move up into the top right hand box and your second edge must be drawn.

The screen will then be cleared and the same process must be repeated for the edges of your second pattern. The main controls are:

5 cursor down at a 45 degree angle
6 cursor down at a 22.5 degree angle
8 cursor up at a 45 degree angle
7 cursor up at a 22.5 degree angle
9 cursor across in a straight line

In addition to these basic controls, however, a sine wave can be drawn by pressing 1.

Also, pressing 0 will copy the edge from the bottom left box into the top right box.

Now that all the edges have been entered, Waves will come up with the question "South to North?". Pressing Y will mean that your net patterns will have lines drawn from the bottom edge to the top edge.

If you reply Y to the following question, "West to East?", your patterns will have 10 intermediate lines drawn from the left of the screen to the right. If you reply Y to both questions you will have criss-cross net patterns.

You can escape from the graphical display by pressing E. The program will then print the message:

PRESS S TO SAVE FRAMES
R TO RESTART PROGRAM
A TO SEE ANIMATION

To enter Waves, first type in the Basic program in listing 1 and save it by typing:

SAVE "WAVES" LINE 4

New the program and type in listing 2. Run this program and type in the hex code in listing 3, remembering to enter the checksum at the end of each line. Now save this code directly after the Basic program by typing:

SAVE "WAVECODE" CODE 65400,100

Now rewind the tape, type

LOAD "WAVES"

and you are ready to start using Waves!

If you do not wish to type in the program and code, simply send a blank tape, SAE and £1 to me at: 5 Western Drive, Shepperton, Middlesex TW17 8HJ for a copy of Waves plus an example of what the program can do. ■

MOVING SCR

Rae West explains a routine which will switch between screens for animation or Help pages.

SWITCH ON your 64; the screen memory starts at 1024 — hex 0400 — so that, for example,

POKE 1024,1

puts an A in the extreme top-left corner — older 64s may need colour Ram to be poked too. Right? For most purposes, this is assumed to be a fixed feature of the 64.

What's less well known is that the screen can be repositioned through most of the machine's 64K of Ram. The diagram shows the normal situation, with about 39000 bytes of Basic positioned between the top of the screen — $08000 — and Rom at $A000. But we can move the screen, in minimum steps of $0400, anywhere in memory.

Screens under Rom

Some locations aren't suitable, as machine-language programmers will appreciate — for example the zero-page, at the very start of memory, cannot be used as a normal screen. My example puts screens under Rom, partly because many programmers don't know how to use this area (machine language is usually needed), so it's usually free, and partly to avoid the complication of altering Basic pointers to prevent programs overlapping the screen area.

"Moving the screen" — what does this mean? Nothing to do with the TV! — we want commands like Print and keys like CLR to work normally, but to have freedom to alter the actual position in memory that screen information is stored. If we do the job properly, most things will be unaltered, but Pokes to screen, if used, will be different — the addresses will be much larger than usual since the screen Ram is higher up.

Before we continue, it makes sense to ask why anyone should want to move the screen around. In fact, there are several tricks we can perform with this method, which are impossible otherwise:

- We can switch between screens at will. For example, a Help screen might be permanently set up; a keypress would allow instantaneous switching between conventional processing and such a screen.
- Animation is another possibility: there's room for 16 screens in Bank 1, plus 12K of Basic below them, enough for attractive animation of the piston-engine demo type.
- Screens of user-defined graphics and normal characters can be alternated.

Using interrupt techniques, we can mix screens on the same display.

Attractive patterns

My demonstration program puts four user-defined characters in Ram; these are designed to fit together to produce attractive patterns. The program uses two screens — Apple users will know the kind of thing — Apple has two alternate screens. It fills one screen, displays it, then repeats with the other, so there's no delay while one pattern is overwritten with the next. The result is quite impressive.

Vic-II is the key to the action, and it's necessary to get several things right, which is why the technique isn't too simple. As the diagram shows, Vic-II can be programmed to process only a quarter of the 64's memory at one time. All the character definition information — i.e. patterns of 8 by 8 dots — and the screen Ram, and sprite information must be stored within this 16K. The only exception is the 64's Rom character set, which is wired up to override this requirement.

Moving the screen

So, to move the screen under Rom, we must (i) Set Vic-II to bank 2 or 3; (ii) Set Vic-II to read the character set we want; and (iii) ensure Basic writes to our new screen. This last item

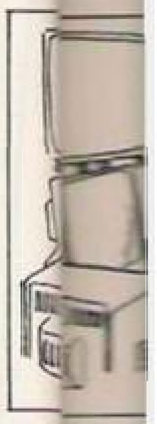


Table 1.

Usable Character Definition and Screen Combinations

Vic Bank 0: selected with POKE 56576,(PEEK(56576)AND 252) OR 3 (DEFAULT)
(usual value is 151)

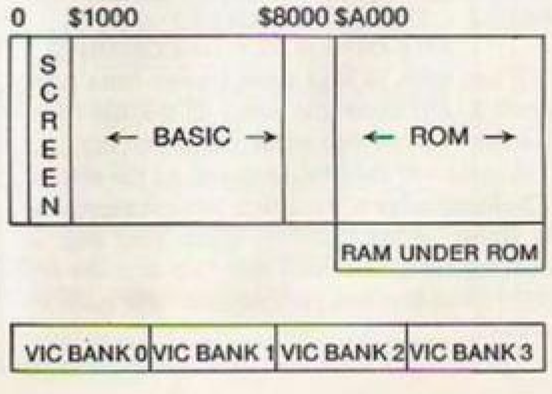
Start of Screen Memory	POKE 648** with	Start of Graphics Character Memory: 2048	ROM char set U.CASE 4096	ROM char set L.CASE 6144	8291*	10240	12288	14336
		POKE 53272 with:						
1024	4	19	21	23	25	27	29	31
2048	8	35	37	39	41	43	45	47
3072	12	51	53	55	57	59	61	63
The screen cannot be placed at 4096-8191, as the Vic sees character ROM here.								
8192	32	131	133	135	137	139	141	143
9216	36	147	149	151	153	155	157	159
10240	40	163	165	167	169	171	173	175
11264	44	179	181	183	185	187	189	191
12288	48	195	197	199	201	203	205	207
13312	52	211	213	215	217	219	221	223
14336	56	227	229	231	233	235	237	239
15360	60	243	245	247	249	251	253	255

*Starred columns correspond to bit-map graphics.
**Not needed with bit-map graphics.

Vic Bank 1: selected with POKE 56576,(PEEK(56576)AND 252) OR 2
(usual value is 150)

Start of Screen Memory	POKE 648 with	Start of Graphics Character Memory: 16384*	18432	20480	22528	24576*	26624	28672	30720
		POKE 53272 with:							
16384	64	1	3	5	7	9	11	13	15
17408	68	17	19	21	23	25	27	29	31
18432	72	33	35	37	39	41	43	45	47
19456	76	49	51	53	55	57	59	61	63
20480	80	65	67	69	71	73	75	77	79
21504	84	81	83	85	87	89	91	93	95
22528	88	97	99	101	103	105	107	109	111
23552	92	113	115	117	119	121	123	125	127
24576	96	129	131	133	135	137	139	141	143
25600	100	145	147	149	151	153	155	157	159
26624	104	161	163	165	167	169	171	173	175
27648	108	177	179	181	183	185	187	189	191
28672	112	193	195	197	199	201	203	205	207
29696	116	209	211	213	215	217	219	221	223
30720	120	225	227	229	231	233	235	237	239
31744	124	241	243	245	247	249	251	253	255

Figure 1.



CREENS



relies on location 648.

PRINT PEEK (648)

usually returns 4, showing the screen starts at $0400.

Memory arrangements

Table 1 — which, so far as I know, hasn't been printed before — summaries the 64's screen memory arrangements. You should be able to see from it that my example puts character definitions from 49152 onwards, and uses two screens, starting at 50176 and 51200, which it switches between. While Print takes place, the "wrong" value of 648 is used, which makes the 64 display the alternative screen.

Incidentally, sprites are usable with this method; sprite pointers are hidden away just above the screen, so when a screen is moved these pointers shift too. One final word: when experimenting, Stop-Restore won't change location 648. So if your cursor seems to have vanished, try

POKE 648,4

to return to normal. ■

Rae West has written a 600 page reference book, *Programming the Commodore 64,* recently published by Level Ltd. It is obtainable from booksellers or by mail from Biblios Distribution, Star Road, Partridge Green, Nr Horsham, W. Sussex at £14.90 plus £1 post.

Vic Bank 2: selected with POKE 56576,(PEEK(56576)AND 252) OR 1
(usual value is 149)

Start of Screen Memory	POKE 648 with	Start of Graphics Character Memory							
				ROM char set U.CASE	L.CASE				
		32768*	34816	36864	38912	40960*	43008	45056	47104
		POKE 53272 with:							
32768	128	1	3	5	7	9	11	13	15
33792	132	17	19	21	23	25	27	29	31
34816	136	33	35	37	39	41	43	45	47
35840	140	49	51	53	55	57	59	61	63

The screen cannot be placed at 36864-40959, as the Vic sees character Rom here.

Above this point in this bank, Ram and Basic Rom co-exist in the memory map; the Vic "sees" the Ram, not the Rom, but the routines that perform screen operations need to read from screen Ram; they can't do so, in this region, without first switching out the Roms and switching in the Ram. This isn't normally done — it can only be done if Basic is not in use. So this area cannot effectively be used for screen Ram. Note, however, that it can be used to store character definitions, since these don't need to be read back, as the Vic chip will read these from Ram while the 6510 reads instructions from the parallel Rom containing Basic.

Vic Bank 3: selected with POKE 56576,(PEEK(56576)AND 252)
(usual value is 148)

Note: only the region of memory $C000-$CFFF (49152-53247) can be used as screen RAM: see the comments above.

Start of Screen Memory	POKE 648 with	Start of Graphics Character Memory							
				Caution: I/O chips					
		49152*	51200	53248	55296	57344*	59392	61440	63488
		POKE 53272 with:							
49152	192	1	3	5	7	9	11	13	15
50176	196	17	19	21	23	25	27	29	31
51200	200	33	35	37	39	41	43	45	47
52224	204	49	51	53	55	57	59	61	63

To use these tables:

(i) To determine screen start and graphics definition start, Peek contents of 648 and 53272, then refer to the table. Example: when 648 contains 140 and 53272 contains 53, screen Ram starts at 35840 and Rom characters at 36864. Bank 2 is in use; this can be deduced from the position of screen Ram given in 648.

(ii) To set screenstart and graphics definitions, Poke all three parameters, unless already set. Example: POKE 56576, (PEEK(56576)AND252)OR 2: POKE 648,120: POKE 53272,252 selects bank 1, puts screen at 30720 and chooses user-definable characters at 28672. In Basic, POKE 56,28672/256: CLR or POKE 56,112: CLR lowers the top of Basic to protect the definitions and screen.

(iii) To move the normal character definitions, use POKE 56333,127: POKE 1,51 followed by a loop to transfer 53248-57343 (or a subset) to the new position, then POKE 1,55: POKE 56333,129. All this must be in program mode. This method is easier than defining all the characters from scratch.

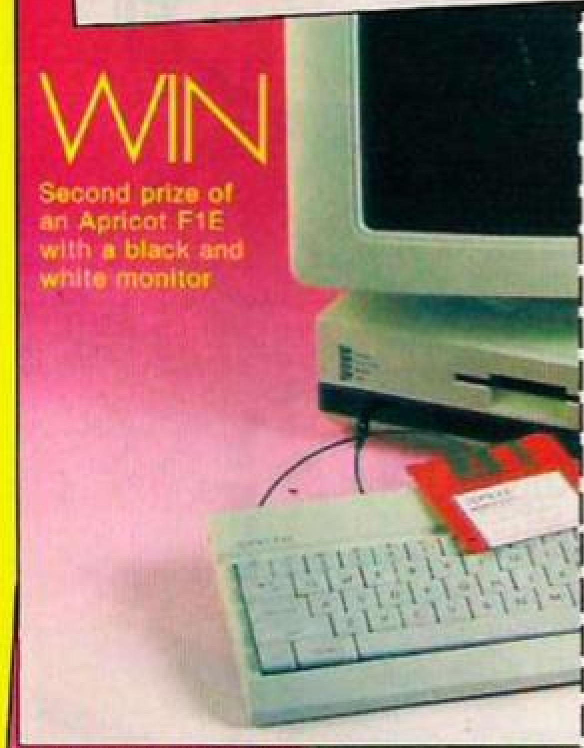
(iv) The Vic-II's bank-switching forces both screen and character definitions to coexist in the same quarter of the 64's memory map. It's perfectly OK to start the screen up at 49152, and store character definitions in the Ram from 61440, say, taking nothing from Basic. Many character sets can be stored simultaneously, in fact.

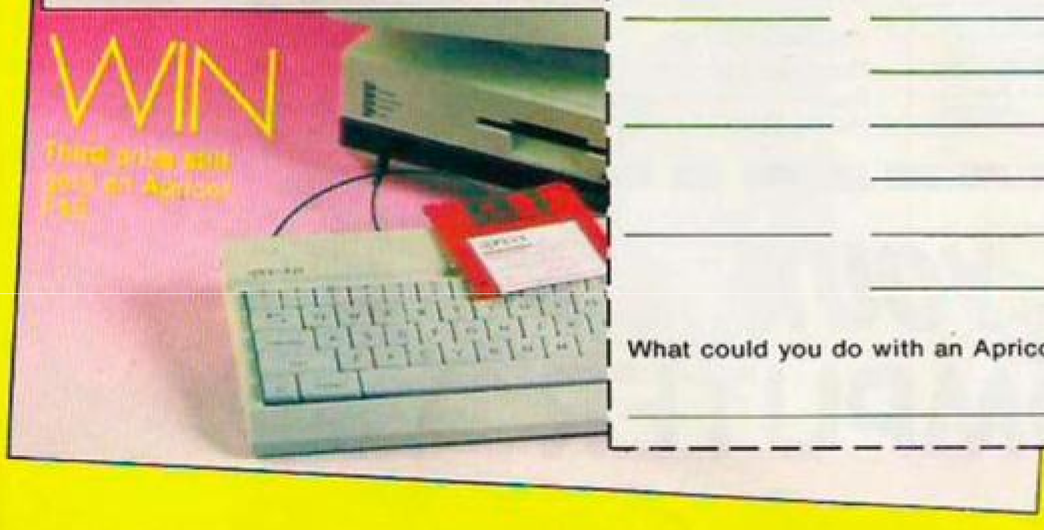
Demo program.

```
0 REM *** 'YOUR COMPUTER' - DEMONSTRATION OF TWO C64 SCREENS ***
10 POKE 56576,148 : REM VIC BANK 3
20 S$="@ABC"      : REM 4 CHARACTERS
30 FOR J=49152 TO 49183: READ X: POKE J,X: NEXT: REM SET UP USER DEFINED CHARS
40 DATA 36,36,255,0,0,255,36,36
50 DATA 36,36,231,36,36,231,36,36
60 DATA 36,18,9,132,66,33,144,72
70 DATA 36,72,144,33,66,132,9,18
99 REM **** NOW WE DISPLAY ONE SCREEN, WHILE WRITING TO THE OTHER:- ****
100 GOSUB 1000: POKE 53272,17: POKE 648,200: REM ONE SCREEN ...
110 GOSUB 1000: POKE 53272,33: POKE 648,196: REM ... OTHER SCREEN!
120 GOTO 100
999 REM **** MAKE A RANDOM STRING OF LENGTH 9 FROM THE 4 CHARACTERS:- ****
1000 X$="": FOR J=1 TO 9: L=RND(1)*4+1
1010 X$=X$+MID$(S$,L,1): NEXT
1020 PRINT "♥": FOR J=1 TO 111: PRINT X$;: NEXT
1030 RETURN
```

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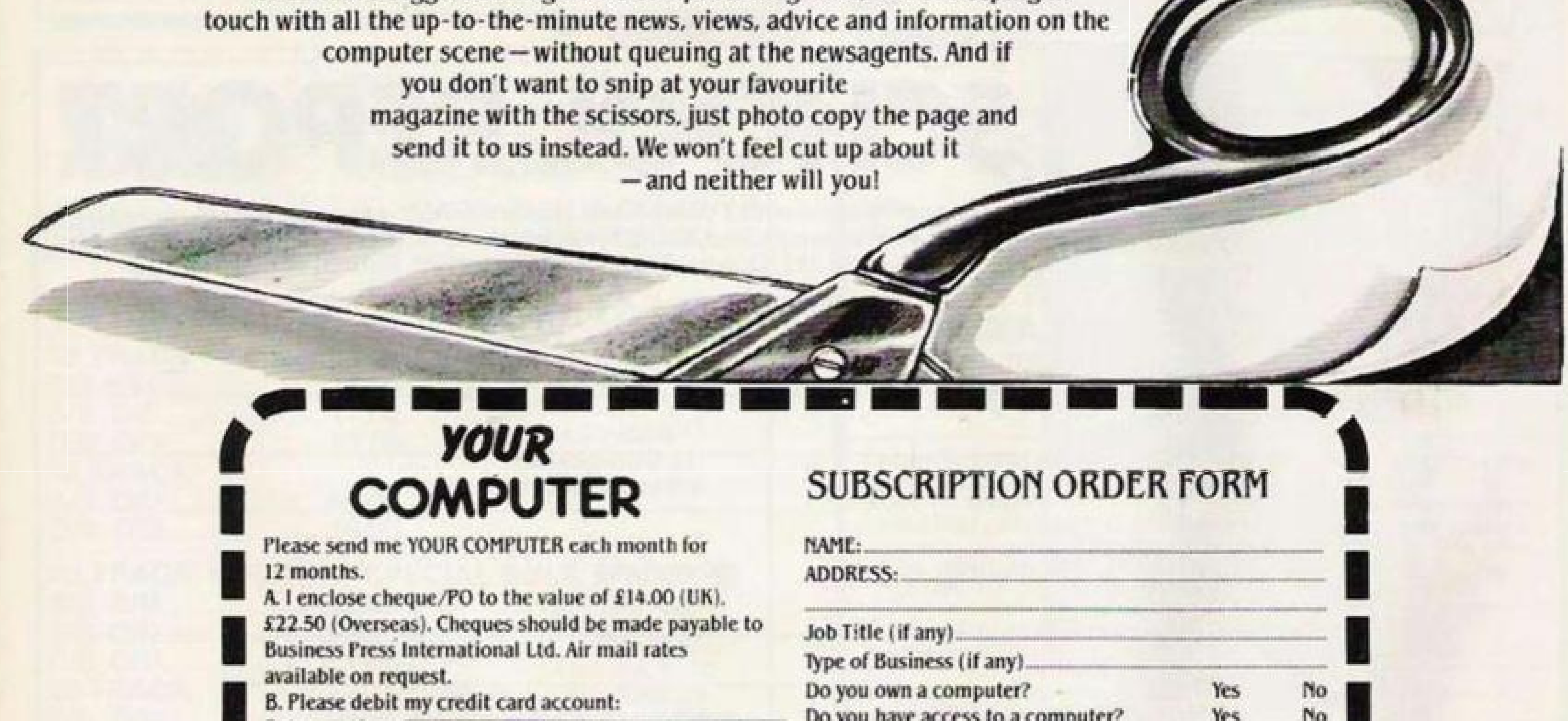
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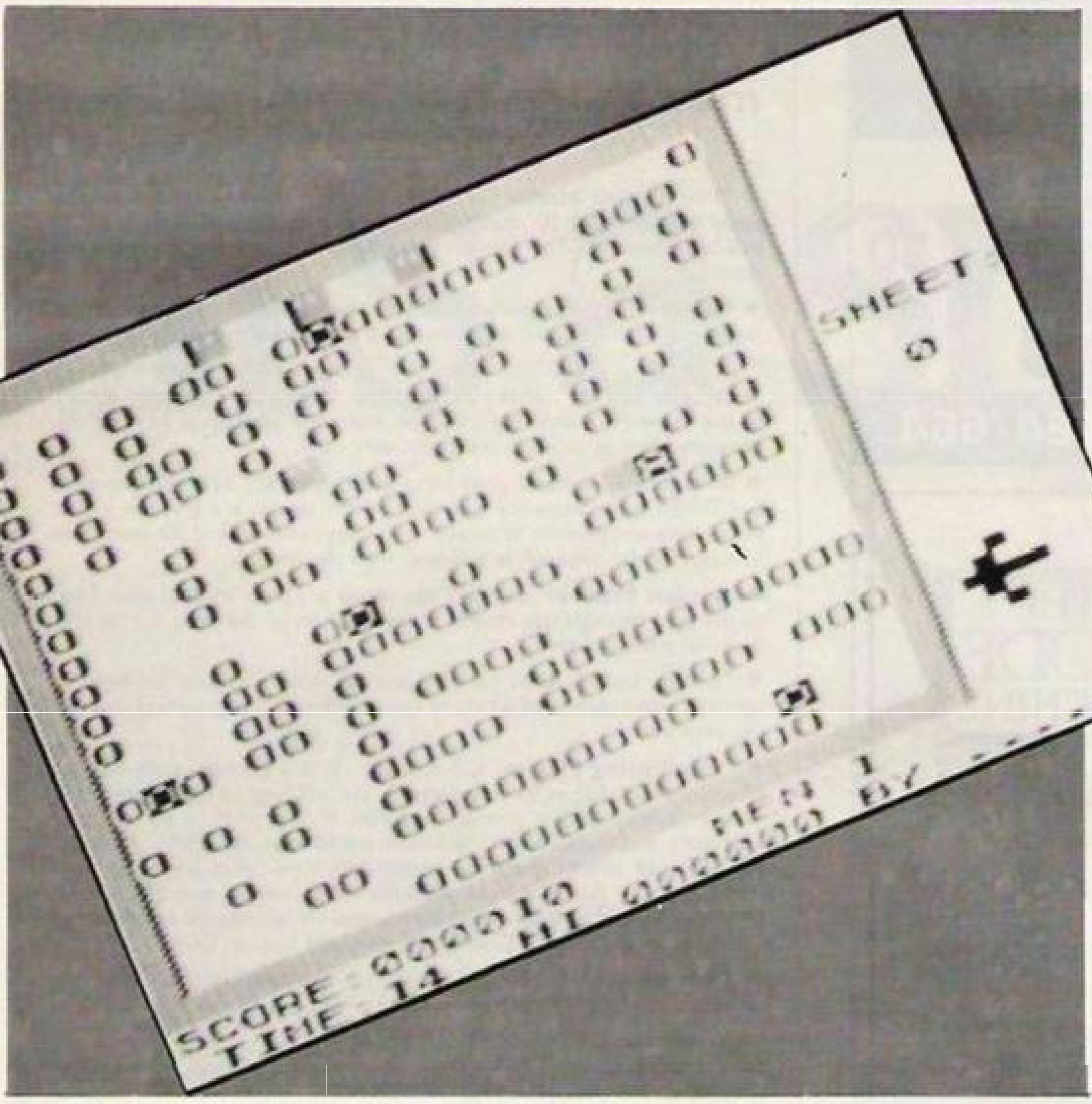
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If so please state type ______________

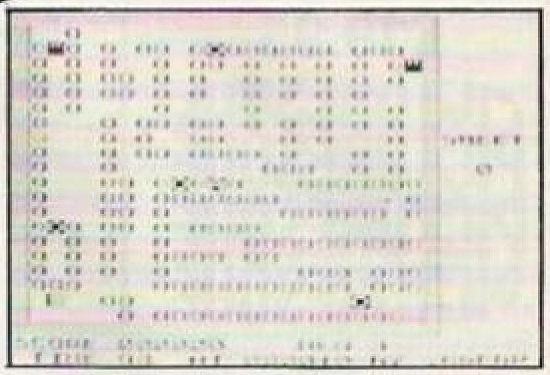
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PO





PONGY IS an amiable little penguin — thanks to the chunky ZX-81 graphics an amiable little inverse letter A — that has to collect diamond ice-blocks. Not particularly served by four sno-bees.

To enter the game, first, you have to create a Rem line with enough characters to hold the machine-code. You can do this very easily: Enter a line 1 like this

1 PRINT 0 + 0 + 0 + 0 + 0 + 0 + .. etc.

until you have typed 43 zeros. Check the line by typing

PRINT PEEK 16511 + 256*PEEK 16512.

This should give 345. If not, accord your print statement. Then edit this line eight times, until you have lines 1 to 9. Now enter the following commands:

POKE 16510,0
POKE 16511,65
POKE 16512,12
POKE 16513,118
POKE 16514,118
POKE 16419,5
5 SAVE "PONGY"

Miquel Van Smoorenburg with a ZX-81 game featuring that character we all know and love — the amiable little inverse A who tries to survive against the psychotic tendencies of four nasty inverse 0s.

Don't type Newline during the poking to obtain a listing or the computer will crash! If it does crash, switch your 81 off and try again. If everything is OK, enter the hexloader and the hexcodes as usual. Now save it, for security, and delete the hex-loader. Enter lines 10-50 from the Basic listing, and enter Run 10. The game should start. You can break out of the game by pressing Break during the title-screen. Typing Run will autosave the game. The speed of the game is changeable:

the Poke in line 10 controls sno-bee speed
the Poke in line 20 controls timer-speed and
the list in line 30 controls pongy-speed.

Decreasing the values will increase the speed. Changing pongy-speed also affects the timer. It is also possible to change the number of lives you have, to a maximum of 9, by typing POKE 18006, 28 + (number of lives)

If you are interested in creating your own Pongy screen layouts, you have to enter lines 100-430. Enter Run 100, and you are to create your own layout.

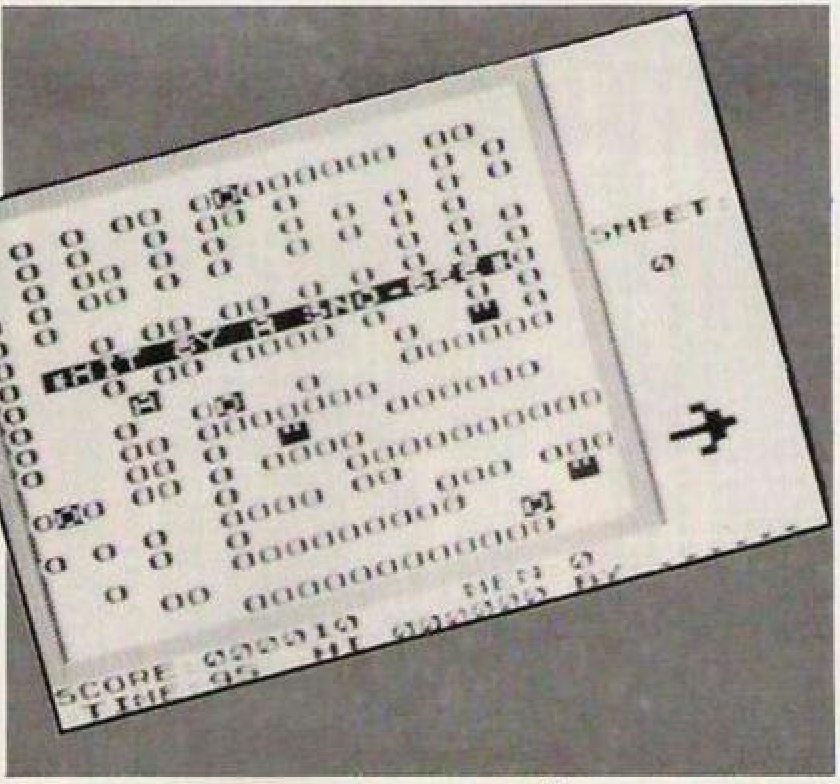
Use cursor keys to move. If you are satisfied, press 0 and enter the screen-number: 1 to 4. Then you can place the diamonds wherever you wish, use 0 to enter. After you have entered four diamonds, the program stops. You can then watch the result of your action by typing Run 10.

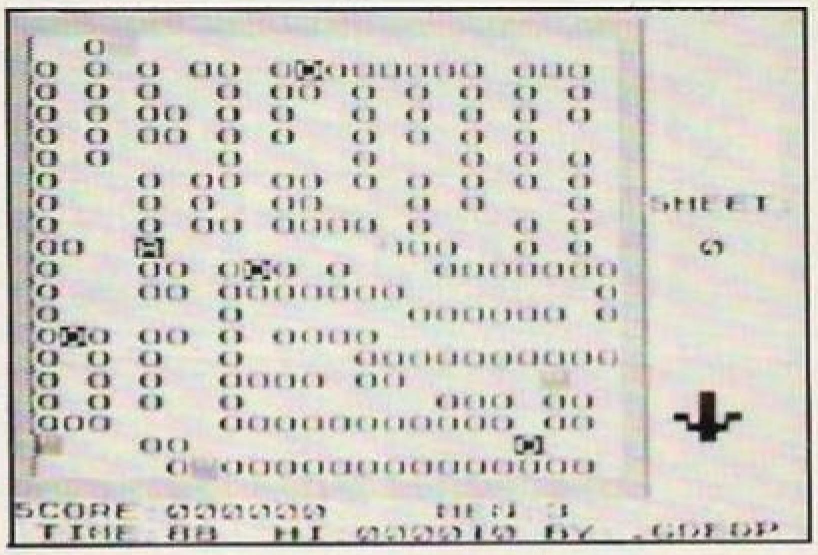
You start the game in the middle of the screen. Your task is to connect three or more diamonds — inverse 0's — in one straight line. Movement is made with the arrow keys, and the direction of Pongy is shown by one big

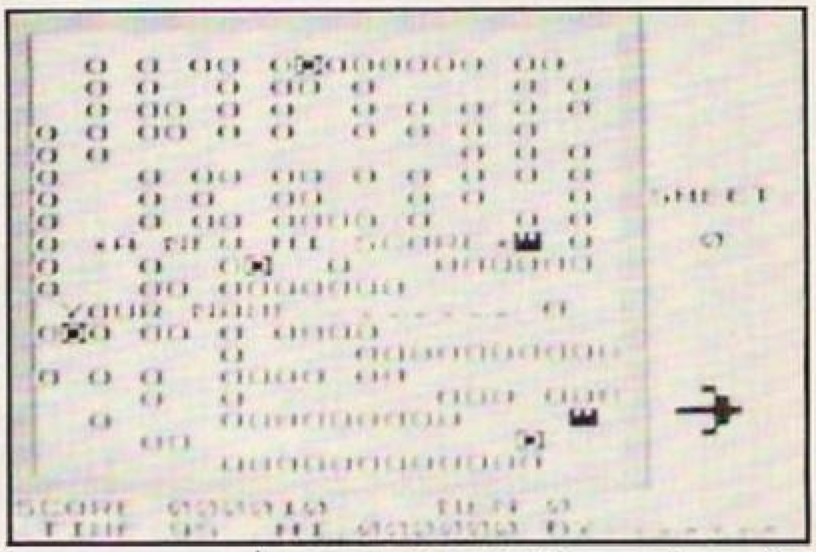
Hex loader.

```
  5 REM HEXLOADER
 10 PRINT "START ADDRESS"
 20 INPUT S
 30 PRINT "FINISH ADDRESS"
 40 INPUT F
 50 FOR N=S TO F STEP 8
 60 LET T=0
 70 PRINT N;": ";
 80 INPUT A$
 90 PRINT A$;" = ";
100 INPUT TOT
110 PRINT TOT
115 IF PEEK 16422=2 THEN SCROLL
120 LET Z=0
130 FOR K=1 TO LEN A$ STEP 2
140 LET C=(CODE A$(K)-28)*16+CO
DE A$(K+1)-28
150 LET T=T+C
160 POKE N+Z,C
170 LET Z=Z+1
180 NEXT K
190 IF TOT=T THEN GOTO 220
200 PRINT "ERROR - PLEASE INPUT
AGAIN"
205 IF PEEK 16442=2 THEN SCROLL
210 GOTO 60
220 NEXT N
```

NGY







arrow on the left hand side of the screen.

To move blocks, position Pongy against the block you want to move and press 0. If another block, or the wall, is behind the block it will be grinded to powder — keep 0 pressed — unless it is a diamond. You can kill the sno-bees by squashing them with a block and 10 points are gained for that. However the sno-bees will re-appear in the left-hand corner.

If you have succeeded in positioning three or more blocks in one straight line, you get a bonus of 10xtime left, and when time reaches zero, you move on to the next sheet. In total there are four different sheets. When you are out of lives, the game ends. You can also abort the game by pressing Break. If the high-score is beaten, the computer will ask you to enter your name — don't forget to press Newline. Answering the question "another game?" with N will bring you back to the title screen.

It is possible to hold the game by pressing H. Press another key to continue.

If you don't feel up to the task of typing in the listings, or you cannot manage to get the program to work — not very likely — the game is available on a fresh cassette tape for f10 — Dutch guilders, or £3 — from Miquel Van Smoorenburg, 20 Baljuwstraat, 2461 sl Ter-Aar, Holland.

(hex dump on next page)

Listing 1.

```
   5 SAVE "PONGY█"
  10 POKE 16508,5
  20 POKE 16507,6
  30 LIST 4000
  40 RAND USR 17971
  50 REM *DONT FORGET THIS LINE*
  60 REM
 100 REM ONLY ENTER THE FOLLOW
 ING LINES IF YOU WANT TO DEFINE
YOUR OWN SHEETS.
 110 LET A$="▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒
▒▒▒▒▒▒▒▒"
 120 PRINT AT 0,0;A$;AT 21,0;A$
 130 FOR X=1 TO 20
 140 PRINT AT X,0;"▒000000000000
0000000000▒"
 150 NEXT X
 160 LET P=PEEK 16396+PEEK 16397
*256+35
 170 LET P1=P
 180 LET K$=INKEY$
 190 LET P=P+(K$="8")-(K$="5")+3
3*((K$="6")-(K$="7"))
 200 IF PEEK P=136 THEN LET P=P1
 210 POKE P1,0
 220 IF K$="0" THEN GOTO 250
 230 POKE P,166
 240 GOTO 170
 250 INPUT A
 260 IF A<1 OR A>4 THEN GOTO 250
 270 RAND A
 280 LET A=USR 17974
 285 LET X=1
 290 LET Y=1
 295 LET A$=" "
 300 PRINT AT X,Y;
 305 FOR N=1 TO 4
 310 PRINT A$;AT X,Y;
 320 LET A$=CHR$ (PEEK (PEEK 163
98+PEEK 16399*256))
 325 PRINT "█";AT X,Y;
 330 LET K$=INKEY$
 340 LET X=X+(K$="6" AND X<20)-(
K$="7" AND X>1)
 350 LET Y=Y+(K$="8" AND Y<22)-(
K$="5" AND Y>1)
 360 IF K$<>"0" THEN GOTO 310
 370 POKE A,X
 380 POKE A+1,Y
 390 LET A=A+2
 400 LET A$="█"
 405 IF INKEY$>"" THEN GOTO 405
 410 NEXT N
 420 PRINT AT X,Y;A$
 430 PRINT AT 21,3;">READY"
A000    ----P-O-N-G-Y---------
  (C) MIQUEL VAN SMOORENBURG
  JANUARI-FEBRUARI 1985.
```

Hex dump.

```
16514: 7676C36844C3FF44 = 1121
16522: 322E363A2A31003B = 358
16530: 1B381B0038263E38 = 322
16538: 0E3C2D3E0026372A = 316
16546: 003E343A00313434 = 325
16554: 302E332C002E3339 = 343
16562: 3400323E00353734 = 324
16570: 2C372632000F0031 = 251
16578: 2E38392A33003934 = 361
16586: 00282C392D002E33 = 286
16594: 38392A26291B1B1B = 315
16602: 1BD450AB4F0101AC = 743
16610: 50020116520401E7 = 423
16618: 5103020000FFFF21 = 629
16626: 00DFFF0100040201 = 486
16634: 0303E84000000000 = 302
16642: 010000C951000158 = 372
16650: 04F7407E4F070100 = 656
16658: 8403010001000500 = 142
16666: 8682010001878200 = 531
.16674: 0105010001008600 = 142
16682: 0384010001E521ED = 636
16690: 40FE053005871600 = 533
16698: 5F195E2356E1C9E5 = 990
16706: ED4B254079FEFF28 = 1083
16714: 04CDBD077E320141 = 647
16722: D620CD2F41ED53FF = 1138
16730: 407BA72804ED5302 = 720
16738: 413EEFDBFE2FE601 = 1117
16746: 32FE40E1C93A0141 = 918
16754: D621FE04D0878787 = 1118
16762: 06004F210F4109ED = 444
16770: 5B0541010300EDB0 = 578
16778: EB011E0009C5EB01 = 708
16786: 0300EDB0C1EB09EB = 1088
16794: 010200EDB0C9E52A = 888
16802: 3240ED5B334019ED = 819
16810: 5B344019223240 7D = 505
16818: E1C932FB400D2053 = 919
16826: 22FC40EB36000608 = 653
16834: 32FB40CD2F41197E = 833
16842: FE082841D5CDA041 = 1010
16850: D1E61FFE10280D7E = 919
16858: FE8B2831FEA6282D = 987
16866: FE34280FA72826ED = 843
16874: 52CDA041E6033C10 = 821
16882: CF181AD5CDA041D1 = 1109
16890: E61FFE103EFF20E4 = 1108
16898: 36080E05A7ED52EB = 802
16906: 2AFC4071EB7EFEA6 = 1252
16914: 2004AF323C40368B = 578
16922: C921DD400604C5E5 = 955
16930: 5E2356237E234ECD = 694
16938: B441EBE173237223 = 1004
16946: 3AFB40772323C110 = 771
16954: E5C9CD41412ADB40 = 1090
16962: 3600197EA72807FE = 673
16970: 6B28032ADB4022DB = 760
16978: 4036A6C9010000C9 = 687
16986: 3AFE40A728F62ADB = 1090
16994: 40ED4B0241097E5F = 673
17002: FE082806E63FFE34 = 907
17010: 20E2E5097EE1FE88 = 1237
17018: CA3043E63FFE34CA = 1118
17026: 3043AF320441E509 = 647
17034: 7EE3FE882818E63F = 1103
17042: FE342815FE08CCF4 = 1080
17050: 423600E173D51120 = 722
17058: 0318 7AB320FBD118 = 847
17066: DDC17B010000FEB4 = 972
17074: C02B7EFEB4282223 = 904
17082: 237EFEB4281B01DE = 885
17090: FF097EFEB4280A01 = 875
17098: 4200097EFEB40E00 = 649
17106: C001DFFF11210018 = 745
17114: 0601FFFF11010009 = 544
17122: 7EFEB428FA010000 = 851
17130: 197E0CFEB428F9C9 = 1087
17138: E1C9E5D5C509EB21 = 1342
17146: DD400604C5E54E23 = 834
17154: 46626BA7ED42E1D5 = 1183
17162: 280C23232323D1C1 = 594
17170: 10EAC1D1E1C9EB2A = 1355
17178: 0C40012300 09EB73 = 471
17186: 2372233801233810 = 344
17194: 23CD0D4418E07B01 = 693
17202: 0000FEB4C83A0441 = 761
17210: 3C320441FE04D836 = 707
17218: 08FE07D83600AF32 = 764
17226: 0441C9ED4B0B410A = 668
17234: CD2F412A0D41197E = 588
17242: CB7F200F0A03FE03 = 647
17250: 200301F740ED430B = 662
17258: 4118E0220D41444D = 570
17266: C90659C5CD4D4336 = 896
17274: 88CD4D433688CD4D = 957
17282: 433680C110EDC927 = 935
17290: 34333A380E1C1C1C = 315
17298: 0035393800003400 = 218
17306: 0000000000000000 = 0
17314: 3434000000AF323C = 389
17322: 402A0C40114F0119 = 304
17330: E5010E00119743ED = 716
17338: B0D1D5218943010E = 850
17346: 00EDB0E1E5110700 = 891
17354: 19ED4B084178A728 = 737
17362: 15C5E5CD1A44CD73 = 1066
17370: 43E1C110F4ED4B08 = 1065
17378: 41CD0D4410FB11FF = 890
17386: FF1B7AB320FBD121 = 1108
17394: 9743010E00EDB006 = 652
17402: 59C5CD4D433688C1 = 1018
17410: 10F73EFF32214032 = 777
17418: 3C40C9E52A0C4011 = 689
17426: E10219CD1A44E1C9 = 977
17434: 7EFE1CD8FE26D034 = 1176
17442: FE25C0361C2B18F0 = 872
17450: 0EFF3A08413D3208 = 519
17458: 41C03A7B40320841 = 625
17466: 3A09413D3209412A = 359
17474: 0C4001FF02097EFE = 723
17482: 1C380DFE26300935 = 499
17490: FE1CC036252B18EE = 870
17498: 23369C23369C0100 = 491
17506: 0079323C40C92A0C = 550
17514: 40220D4101F740ED = 725
17522: 430B41E501770109 = 502
17530: 22DB40E1E5014B02 = 849
17538: 09220541E1012300 = 374
17546: 0922DD4001150009 = 359
17554: 22E140015E020922 = 463
17562: E5400115000922E9 = 591
17570: 403E0421DD402323 = 518
17578: 7723360A233D20F6 = 592
17586: 0000003E04320841 = 189
17594: 3E63000000323C40 = 335
17602: DDE5F1FE02C0DD21 = 1393
17610: CD44C9ED5F010119 = 833
17618: 3EF5CDB502CD9202 = 1048
17626: CD2002DD21CD44F3 = 1009
17634: 3A3C40A7CAA4023A = 775
17642: 0A413D320A41C2A4 = 619
17650: 023A7C40320A41CD = 578
17658: 1B42C3A402CD3C42 = 785
17666: FE8B28163A3C40A7 = 804
17674: 2810CD6F41CD5A42 = 798
17682: 79FE04D4A743CD2A = 1072
17690: 44C9010100AF323C = 556
17698: 40C9DFFFFD520115 = 1100
17706: 695554AD5552B55D = 888
17714: 7BDD5749555D675D = 878
17722: 7485D5DFE35728E0 = 1263
17730: 1C80FE72FC094A1F = 890
17738: F56F001584FF56FE = 1104
17746: 2078008F3FFFFE80 = 995
17754: 000E020809131302 = 76
17762: 0B14FFFFFC000010 = 809
17770: 7FFFC100007FFFF0 = 1197
17778: 000807FFEFC04021 = 798
17786: FDFFBC80008FFFFE = 1476
17794: 003000FCFFFD1100 = 825
17802: 0FFFFF8000027FFF = 1037
17810: E9000027FFFF8000 = 910
17818: 00030311130B150E = 88
17826: 0214C00005DD17D5 = 676
17834: 5450575141494505 = 544
17842: 0517D41441575305 = 500
17850: 556C1554E7D55110 = 839
17858: 45FFD116007DFA80 = 1058
17866: 140AFFD4BA0052AF = 940
17874: FDFA80152BFFD4E8 = 1394
17882: 000B021007 0B1305 = 71
17890: 0C14FFFFFC08021F = 835
17898: FFFF608025BFFFD6 = 1431
17906: 801D5AFFF56A0055 = 938
17914: ABFD56A1055ABFD5 = 1170
17922: 6AF055AA0156AFFD = 1116
17930: 5A80056BFFF5A010 = 1006
17938: 16FFFFDA01007FFF = 1133
17946: FF0B090108011013 = 320
17954: 081414141414C33C = 363
17962: 7A7600012205EA76 = 632
17970: 76C3704AC30149CD = 973
17978: F847CD2948160033 = 710
17986: 382834372A0E1C1C = 315
17994: 1C1C1C1C00000000 = 112
18002: 322A330E1FFF2100 = 476
18010: 0022F748CDF948FD = 1132
18018: 3621003E63320941 = 372
18026: CD8440CD87403E7F = 994
18034: DBFE1FD21F473EBF = 1069
18042: DBFECB67CCB2462A = 1273
.18050: 0A402B7CB520FB79 = 826
18058: A72831FE01280218 = 577
18066: DACD294808033C17 = 630
18074: 2D2E3900273E0026 = 287
18082: 0038333416272A2A = 304
18090: 17FFCDE946C36A46 = 1157
18098: FD363C00CDE147FD = 1121
18106: 363CFFC93A2140A7 = 892
18114: 2036CD294808033C = 475
18122: 17343A3900342B00 = 285
18130: 392E322A1B1B17FF = 527
18138: CDE946CD29481706 = 855
18146: 332525FFC365462A = 788
18154: 0C4001EB02097EFE = 703
18162: 1D382A35CDE748C9 = 869
18170: CD2948080022B1717 = 417
18178: 3828372A2A330028 = 326
18186: 343235312A392A29 = 386
18194: 1717FF2AF7482322 = 731
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18210: 3C002A0C4001DD02 = 402
18218: 09115D49E5D50606 = 646
18226: 1ABE381E20042313 = 392
18234: 10F6D1E1CD294808 = 1022
18242: 032B17172C26322A = 266
18250: 00343B2A371717FF = 509
18258: 185ED1E1010600ED = 796
18266: B0CD29480A032B17 = 573
18274: 2600332A3C002D2E = 282
18282: 00382834372A17FF = 523
18290: CD29480D02333E34 = 498
18298: 3A37003326322A0E = 308
18306: 001B1B1B1B1B1B00 = 162
18314: FF2A0C4001C00109 = 576
18322: D9CDE147D9FE7628 = 1347
18330: 0AFE4030F3CDD247 = 1105
18338: 7718ED2B2B2B2B2B = 595
18346: 116749010600EDB0 = 613
18354: CD29481003 3D2633 = 487
18362: 34392D2A37002C26 = 333
18370: 322A000FFFCDE147 = 863
18378: FE33CA704AC33946 = 1015
18386: E52B2B2B2B545D1B = 605
18394: 010600EDB0E1C93A = 904
18402: 25403C20FAED4B25 = 792
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18418: 7EC93E171801AF2A = 654
18426: 0C400E1806202377 = 306
18434: 2310FC0D20F6C917 = 818
18442: 1717171717171717 = 184
18450: 1717171717000000 = 115
18458: 0000000000000000 = 0
18466: 00000000002122D9 = 284
18474: FD362200E146234E = 749
18482: 237E23F5E5CDF508 = 1120
18490: C12A0E401109487E = 537
18498: 120A03CB77200577 = 509
18506: 132318F3F1C5EB11 = 1011
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18522: 2B2823FE33281DFE = 746
18530: 3D2816CD8C482100 = 573
18538: 002B7CB520FBED5B = 959
18546: 0E40210948EDB018 = 629
18554: 03CD8C48D9C90616 = 866
18562: CD9948CD8C4810F8 = 1111
18570: D9C92A0E40597EC6 = 951
18578: 8077231D20F8C921 = 825
18586: 401F2B7CB520F8C9 = 927
18594: 19368810FBC92A0C = 737
18602: 401101000618CDA2 = 479
18610: 481121000615CDA2 = 516
18618: 4811FFFF0617CDA2 = 995
18626: 4811DFFF0615CDA2 = 961
18634: 48C9237EFE88C0C5 = 1213
18642: 010B0009C1C92A0C = 469
18650: 4001D602EDB1C028 = 930
18658: 36002318F73EA6CD = 793
18666: D8483E8BCDD8483E = 1044
18674: 08CDD848C900003E = 764
18682: FFED4BF7481806AF = 1091
18690: ED4B32400D322140 = 586
18698: C5CDA848C179E603 = 1189
18706: 470E00CB38CB19CB = 775
18714: 38CB1921244509EB = 666
18722: 2A0C400123000906 = 169
18730: 373A2140A71AF5CC = 852
18738: AD49F1C498491310 = 943
18746: F0424BEB3A2140A7 = 938
18754: C80604CD894910FB = 892
18762: CD29481700330039 = 449
18770: 2E322A0E25250000 = 226
18778: 2D2E0E1C1C1C1C1C = 245
18786: 1C00273E0E1B1B1B = 224
18794: 1B1B1BFFCD294808 = 662
18802: 1833382D2A2A390E = 331
18810: FF011A0ACDF508ED = 987
18818: 4BF748CD980AC9C5 = 1159
18826: 46234E23E5CDF508 = 905
18834: E13EB4D7C1C9D55F = 1384
18842: 16083E00CB133802 = 372
18850: 3E3477CDCC481520 = 767
18858: F1D1C9D51100087E = 1015
18866: FE10CB13CDCC4815 = 994
18874: 20F57BD112C93434 = 932
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18898: 1717173434341734 = 300
18906: 1734173417341717 = 271
18914: 3417171717173434 = 271
18922: 3434341717341717 = 300
18930: 1734171717343434 = 300
18938: 3434171717171717 = 242
18946: 3434341734171717 = 300
18954: 3417343434171717 = 300
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18970: 3417341717173434 = 300
18978: 3434000004000000 = 108
18986: 7600818404000076 = 501
18994: 0080810703047600 = 389
19002: 0280830600760081 = 514
19010: 8005008176858007 = 648
19018: 0381807685800400 = 643
19026: 8501768507800005 = 525
19034: 0076850584008500 = 521
19042: 7680000000060076 = 370
19050: 0282840600000CDF4 = 719
19058: 47CD294802063D3C = 518
19066: 2A312834322A0039 = 332
19074: 341B1B1BFF01000C = 401
19082: CDF508064C11244A = 667
19090: 1AD71310FBCDE24A = 1032
19098: CD2948100D3D1028 = 464
19106: 11001D2524210027 = 191
19114: 3EFFCD294811083D = 721
19122: 322E363A2A31003B = 358
19130: 2633003832343437 = 354
19138: 2A33273A372CFFCD = 749
19146: 2948170A3D35372A = 357
19154: 3838002633 3E0030 = 311
19162: 2A3EFFCDE24A18FB = 1139
19170: 11C0490614C5CD31 = 759
19178: 4BCD124BC13A2540 = 725
19186: 3C201210F0061FC5 = 600
.19194: CD124BC13A25403C = 710
19202: 200310F3C9E13E7F = 909
19210: DBFE1FDA3946CF0C = 1068
19218: D5CD99482A0C4001 = 762
19226: 4801095 45D3E0528 = 369
19234: 011E00EDB82B1B1B = 549
19242: 1B2B3D20F2D1C92A = 857
19250: 0C4001A700090605 = 264
19258: C51A13FE3420023E = 644
19266: B4CBB77701210009 = 728
19274: C110EDC9C3 = 842
```

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COMMODORE 64, BBC AND SPECTRUM

THE PROGRAMS given here will enable Spectrum, BBC, and CBM-64 owners to download via *Your Computer's* Telsoft service. Each month for each machine we transmit at least one — and usually two — of the main programs appearing in the current issue. Also available is the full user to user communications program, Dialsoft.

So far OE LTD's Telemod 2 and the VTX 5000 modems have been tested with the BBC and Spectrum but the service also works with

Figure 1. CBM-64.

```
5 REM    HEX LOADER FOR CBM 64    FIG.1
6 REM
10 FOR I=680 TO 727:READA:POKEI,A:T=T+A
20 NEXT:IF T=6716 THEN GOTO 100
30 PRINT"ERROR IN DATA ";T-6716:END
40 DATA 169,1,133,186,169,1,133,184
50 DATA 133,185,169,8,133,183,169,208
60 DATA 133,187,169,2,133,188,169,56
70 DATA 133,251,169,199,133,252,169,251
80 DATA 162,231,160,206,32,216,255,96
90 DATA 68,79,87,78,76,79,65,68
100 SA=51000:LA=52855
110 INPUT"START ADDRESS";A
120 IF (A<SA) OR (A>LA) THEN GOTO 140
130 IF A/8=INT(A/8) THEN GOTO 150
140 PRINT:PRINT"ADDRESS ERROR":GOTO 110
150 T=(A-32768)AND255:PRINTA;:INPUTD$
160 IF D$="END" THEN GOTO 900
170 IF LEN(D$)=20 THEN GOTO 190
180 PRINT"WRONG LENGTH":GOTO 150
190 FOR B=0 TO 7:B$=MID$(D$,2*B+1,2)
200 GOSUB 300:IF E=1 THEN GOTO 280
210 POKE A+B,D:T=T+D:NEXT
220 B$=MID$(D$,18,3):GOSUB 300
230 IF E=1 THEN GOTO 280
240 IF T=D THEN GOTO 260
250 PRINT"CHECKSUM ERROR":GOTO 150
260 A = A+8:IF A<LA THEN GOTO 150
270 GOTO 800
280 PRINT TAB(8+2*B+D)C$"??"
290 B=8:NEXT:GOTO 150
300 E=0:D=0:FOR N=1 TO LEN(B$)
310 C$=MID$(B$,N,1):GOSUB 400
320 IF E=1 THEN D=N:N=4:NEXT:RETURN
330 D=D*16+X:NEXT:RETURN
400 X=ASC(C$)-48:IF X<0 THEN E=1:RETURN
410 IF X<10 THEN RETURN
420 X=X-7:IF X<10 THEN E=1:RETURN
430 IF X>15 THEN E=1
440 RETURN
500 H$="0123456789ABCDEF"
510 FOR A=SA TO LA STEP 8
520 PRINT A;"? ";:T=(A-32768)AND255
530 FOR B=0 TO 7:X=PEEK(A+B):GOSUB 600
540 T=T+X:NEXT:PRINT"=";
560 Y=INT(T/256):PRINT MID$(H$,Y+1,1);
570 X=255 AND T:GOSUB 600:PRINT
580 NEXT:GOTO 900
600 PRINT MID$(H$,INT(X/16)+1,1);
610 PRINT MID$(H$,1+(XAND15),1);:RETURN
800 SYS 680:C$=CHR$(34)
810 PRINT:PRINT" TO RELOAD CODE :"
815 PRINT:PRINT"   LOAD"C$"DOWNLOAD";
820 PRINTC$",1,1  (RETURN)"
825 PRINT:PRINT"   THEN TYPE   NEW";
830 PRINT"   (RETURN)"
835 PRINT:PRINT"TO RUN THE PROGRAM";
840 PRINT"   SYS 51000  (RETURN)"
900 PRINT:PRINT:PRINT"1  ENTER DATA"
910 PRINT:PRINT"2  PRINT DATA"
920 PRINT:PRINT"3  SAVE DATA"
930 INPUT Z:ON Z GOTO 100,500,800
```

Figure 2. CBM-64.

```
51000 ? A9068D21D08D20D0=3E2
51008 ? A90F8D8602A90E20=2E4
51016 ? D2FFA9008D15D0A9=4DD
51024 ? FF8D8A02BA8E92CE=510
51032 ? 20CAC920C7CB20F8=4D5
51040 ? CAAD80CEC931F023=532
51048 ? C935F014C936D006=43F
51056 ? 208EC74C5BC7A914=410
51064 ? 20D2FF202FCBD0DB=52E
51072 ? 203FC8A92020D2FF=461
51080 ? 4C93C94C4AC82063=411
51088 ? CC2022CDA95B85FD=4F1
51096 ? A9CE85FE2028CDA0=547
51104 ? 002095CC202FCBC9=404
51112 ? 44F00BC954D0ED20=4E1
51120 ? D2FFA901D007A944=4EF
51128 ? 20D2FFA90885BA20=4B9
51136 ? 25CDA90820ABCCA9=4A3
51144 ? BD85FDA9CD85FEA0=6A0
51152 ? 002095CC2025CD20=383
51160 ? 95CC9848A0048C83=4CC
51168 ? CE20D8C968A82025=4C4
51176 ? CD2095CC9848A906=4C5
51184 ? 8D83CE20D8C9ADA7=5E3
51192 ? CE85FBADA8CE85FC=6EA
51200 ? 68A82060CBA90185=38A
51208 ? B985B898A293A0CE=539
51216 ? 20BDFFAEA9CEACAA=567
51224 ? CEE8D001C82025CD=479
51232 ? A9FB20D8FF20F1CB=597
51240 ? 6020D9CCC90DD00B=3FE
51248 ? A90085C7A92020D2=3E0
51256 ? FFA90D20D2FF60A9=4E7
51264 ? 0D2029C8A90D20D2=306
51272 ? FF602063CCA900A0=43F
51280 ? FF9993CEC8D0FA20=5FB
51288 ? D2CB90FB20D2CBB0=5ED
51296 ? F88D72CEA9008C7C=4D0
51304 ? CE8C7DCE202ECCAD=4D4
51312 ? 72CE29F0C980D0E4=5C6
51320 ? 20D2CBB0DA9973CE=599
51328 ? C8202ECCC009D0F0=4EB
51336 ? A000AD76CE2980D0=492
51344 ? 07A52B85FB18A52C=3D0
51352 ? 6D75CE85FC4CAAC8=587
51360 ? AD78CE85FBAD79CE=607
51368 ? 85FC20D2CBB0A820=55E
51376 ? D9CC20D2FFC820D9=607
51384 ? CC202ECCC010D0EA=528
51392 ? A92020D2FFAD75CE=56A
51400 ? 202ECD20D2CBB087=4D7
51408 ? CD7CCEF00BA95820=503
51416 ? D2FF2030C84C57C8=52C
51424 ? 20D2CBB0F8CD7DCE=65D
51432 ? D0EBAD75CEA8B993=687
51440 ? CED00E2030C8A991=4EE
51448 ? 20D2FF4C7EC94C57=51F
51456 ? C8A0008C7CCE8C7D=447
51464 ? CE20D2CBB0F091FB=5BF
51472 ? 202ECCC8CC77CED0=4D3
51480 ? F020D2CBB0E0CD7C=59E
51488 ? CEF008A95820D2FF=4D8
51496 ? 4C57C820D2CBB0CE=4CE
51504 ? CD7DCEF0034C23C9=473
51512 ? 20ACCB2030C8AD75=409
51520 ? CEA8A9009993CEAD=506
51528 ? 84CEC902D02520BC=436
51536 ? CBA9C820F3CBA955=568
51544 ? 2016CDA95020F3CB=432
51552 ? 20C7CBAC73CEC880=54F
51560 ? B993CED02398D0F7=5D4
51568 ? 4C5BC7A9552016CD=3DF
51576 ? 20F1CB4C63C9AC77=4EF
51584 ? CE20D2CB88D0FA20=57D
51592 ? D2CB20D2CB4C47C9=53E
51600 ? 4C5CC8A52B85FBA5=4F5
51608 ? 2C85FCA000B1FB99=52A
51616 ? 2200C8B1FB8523F0=4CE
51624 ? 0BA52285FBA52385=447
51632 ? FC4C9BC918A5FB69=57D
51640 ? 02852D852F8531A5=37B
51648 ? FC6900852E853085=412
51656 ? 32602063CCA9028D=3E1
51664 ? 84CEA90B8D02DE60=4A3
51672 ? 8E81CE8C82CEA200=533
51680 ? A9098DCDCE202FCB=4D4
51688 ? C914F016C90DF051=4E2
51696 ? C924D01920D2FF8D=544
51704 ? C3CEE84CE5C9E000=64B
51712 ? D0E3E000F0DF20D2=554
51720 ? FFCA4CE5C9C93090=554
51728 ? D4C93A901548ADC3=444
51736 ? CEC924F004684CE5=460
51744 ? C968C94190BFC947=4BA
51752 ? B0BB20D2FF38E930=4D5
51760 ? C90A9002E907E005=36A
51768 ? F0AB9DC3CEE84CE5=61A
51776 ? C9E000F0A0E001D0=52A
51784 ? 07ADC3CEC924F095=4FF
51792 ? A92020D2FFA9FF9D=54F
51800 ? C3CEA2008ECFCE8E=544
51808 ? D0CE8ED1CE8ED2CE=659
51816 ? ADC3CEC924D006A9=512
51824 ? 0F8DCDCEE8BDC3CE=5DD
51832 ? C9FFF01D20CBCAB0=5B2
51840 ? 3418BDC3CE6DCFCE=524
51848 ? 8DCFCEA9006DD0CE=566
51856 ? 8DD0CEB020E84C75=534
51864 ? CAADCFCEAC83CE99=642
51872 ? A3CEC8ADD0CE99A3=660
51880 ? CEC8188C83CEAC82=561
51888 ? CEAE81CE602025CD=4ED
51896 ? A200BD41CEC921F0=500
51904 ? 0720D2FFE84CBACA=570
51912 ? 4CDEC9ADCDCE8DCE=65E
51920 ? CEADCFCE8DD1CEAD=6C1
51928 ? D0CE8DD2CE18ADD1=639
51936 ? CE6DCFCE8DCFCEAD=68F
51944 ? D2CE6DD0CE8DD0CE=6BE
51952 ? B005CECECED0E660=625
51960 ? 2063CCA90F8D8602=414
51968 ? A95185FDA9CD85FE=575
51976 ? A000209DCC2025CD=343
51984 ? 209DCC209DCC209D=3DF
51992 ? CC2022CD20A9CC20=3A8
52000 ? 95CC2022CD2095CC=411
52008 ? 202FCB20D2FF608E=421
52016 ? 81CE8C82CE2069CC=4B0
52024 ? 20ECCC20CACCC900=48F
52032 ? D00D20FDCCC931F0=4F0
52040 ? 062001CC4C35CB8D=314
52048 ? 80CEAE81CEAC82CE=597
52056 ? 60AE92CE9A4C5BC7=4CE
52064 ? 2022CDA92285FDA9=465
52072 ? CE85FEA0002095CC=4DA
52080 ? 2025CDA00FA92099=393
52088 ? 93CE88D0FA8D93CE=619
52096 ? 202FCBC914D010C0=417
52104 ? 00F0F520D2FF08A9=50F
52112 ? 209993CE4C80CBC9=50A
52120 ? 0DF00B20D2FF9993=4BD
52128 ? CEC8C010D0DAA920=579
52136 ? 20D2FF60A92020D2=4B4
52144 ? FFA94F20D2FFA94B=58C
52152 ? 20D2FF60A9138D00=452
52160 ? DEA9128D00DE60A9=4CD
52168 ? 538D00DEA9528D00=40E
52176 ? DE60A996188D87CE=547
52184 ? 8C82CEAC82CE2004=4D4
52192 ? CC20ECCCCE87CED0=677
52200 ? 02386020FDCCB0EE=509
52208 ? 60A9FA8C82CEA820=597
52216 ? 04CC88D0FAAC82CE=616
52224 ? 602004CC8AA2A8CA=3EE
52232 ? D0FDAA2069CC6020=454
52240 ? 25CDA90220ABCC20=364
52248 ? 95CCAD8ECE20D2FF=573
52256 ? A92020D2FFA90320=3A6
52264 ? ABCC20D8C9604D7D=40A
52272 ? CE8D7DCEA208AD7D=4AA
52280 ? CE2A9010AD7DCE49=411
52288 ? 088D7DCEAD7DCE49=460
52296 ? 108D7CCE2E7CCE2E=3D5
52304 ? 7DCECAD0E160A000=516
52312 ? A9009900D4C8C018=40E
52320 ? D0F660A99320D2FF=5B3
52328 ? 6048A5A2290FD01F=37E
52336 ? A5D448A5A22910F0=4A1
52344 ? 05A9A44C80CCA920=42B
52352 ? 20D2FFA90085D4A9=51C
52360 ? 9D20D2FF6885D468=53F
52368 ? 6020D2FFC8B1FDC9=620
52376 ? 21D0F6C8602025CD=4B9
52384 ? A90C20ABCC2095CC=46D
52392 ? 60A9058E81CEAAA9=4E6
52400 ? 2020D2FFCAD0FAAE=603
52408 ? 81CE60C914F008C9=505
52416 ? 7FF00160A91460A9=456
52424 ? 7F6020E4FFC9C190=5C4
52432 ? 07C9DBB00338E960=4AF
52440 ? 60C941900EC95B90=494
52448 ? 08C9619006C97BB0=49C
52456 ? 02492060488A4808=2D5
52464 ? 20E1FFD0034C59CB=533
52472 ? 2868AA6860AD00DE=485
52480 ? 49016A9003A90060=250
52488 ? AD01DE6048AD00DE=3C7
52496 ? 49026A6A6860200C=223
52504 ? CDB0FB8D01DE20EC=508
52512 ? CC602025CD2028CD=373
52520 ? A90D20D2FF604829=3A0
52528 ? F06A6A6A6A0930C9=3CA
52536 ? 3A300318690720D2=21F
52544 ? FF68290F0930C93A=31B
52552 ? 300318690720D2FF=2F4
52560 ? 60444F574E4C4F41=2C4
52568 ? 44204D454E552131=243
52576 ? 2020205245434549=228
52584 ? 5645213520202045=1FE
52592 ? 58495420544F2042=28A
52600 ? 4153494321362020=22F
52608 ? 2053415645204259=28A
52616 ? 5445532120285553=285
52624 ? 4520122053544F50=26D
52632 ? 209220544F205245=2C4
52640 ? 5455524E20544F20=2CC
52648 ? 4D454E5520292145=28C
52656 ? 4E544552204E554D=2F9
52664 ? 4245522021494620=281
52672 ? 4144445245535320=2E6
52680 ? 495320494E204845=2C8
52688 ? 582C119D9D9D9D9D=476
52696 ? 9D9D9D9D9D9D9D9D=5C0
52704 ? 9D9D9D9D50524546=481
52712 ? 4958205749544820=305
52720 ? 2421535441525420=2E3
52728 ? 4144445245535320=31E
52736 ? 464F522041524541=220
52744 ? 202146494E414C20=1D3
52752 ? 4144445245535320=236
52760 ? 464F522041524541=238
52768 ? 202150524F475241=22C
52776 ? 4D205449544C4520=237
52784 ? 284D415820313620=1E5
52792 ? 4348415227532920=219
52800 ? 21124E4F54205641=21B
52808 ? 4C4944922C205452=2A5
52816 ? 5920414741494E20=249
52824 ? 3A20214449534320=216
52832 ? 4F52205441504520=26B
52840 ? 2820442F54202920=1E0
52848 ? 3F21000000000000=0D0
```

TELSOFT



A reminder of how to use the Telsoft service.

a number of other makes. For the CBM-64 it will initially only be available with the OEL Comms pack together with the Telemond 2 or similar modem; later we hope to adapt the service to work with Commodore's modem.

To enter the download program first type in the hexloader for your machine — figure 1 — and then enter the machine code — figure 2. Once the program has been saved you can run it by entering CALL &6000 on the BBC, SYS 51000 on the CBM 64, RANDOMIZE USR 60000 on the Spectrum.

To find out what is available and how to receive software dial up Colchester (0206) 8068. This audio recorded information line will also advise you which telephone numbers to ring for the 300 and 1200 bit/s services.

When a program you want to download is on line, make sure your modem is set up and dial the number appropriate to its speed. As soon as you hear the modem tones switch the modem to line and replace the receiver. Select Option 1 from the menu — Receive. After a block of data is received you will see "OK" printed if there are no errors, otherwise the program will wait for the blocks to come round again. When the "Program loaded OK" message appears return to the Telsoft menu and select Option 5. You can now save and run the program.

Note that CBM-64 owners will need to use Option 6 if machine code is to be saved.

Figure 1. BBC.

```
10 REM BBC HEX CODE LOADER
15 HIMEM=&69FF
20 CLS:PRINT
30 INPUT " START ADDRESS (Hex)";A$
40 A=EVAL("&"+A$)
50 IF A>&6F87 THEN 280
60 IF A<&2A00 OR A>&6FE7 THEN 20
70 PRINT ~A" ";
80 INPUT ":" B$,C$
90 IF LEN(B$) <>16 THEN 50
100 T=0
110 FOR N=0 TO 7
120 X$= MID$(B$,2*N+1,1): GOSUB 300
130 IF E=1 THEN 260
140 X$= MID$(B$,2*N+2,1): GOSUB 300
150 IF E=1 THEN 260
160 B= EVAL("&"+MID$(B$,2*N+1,2))
170 ?A=B:A=A+1:T=T+B
180 NEXT
190 FOR M = 1 TO LEN (C$)
200 X$=MID$(C$,M,1):GOSUB 300
210 IF E =1 THEN A=A-1: GOTO 260
220 NEXT
230 IF T= EVAL("&"+C$) THEN 50
240 PRINT "CHECKSUM ERROR !"
250 A=A-8:GOTO 50
260 PRINT "TYPING ERROR :"
270 A=8*(A DIV 8):GOTO 50
280 *SAVE "DOWNLOAD" 6A00 6F87
290 END
300 E=0:IF ASC(X$)<48 THEN E=1:RETURN
310 IF ASC(X$)<58 THEN RETURN
320 IF ASC(X$)<65 THEN E=1:RETURN
330 IF ASC(X$)>71 THEN E=1
340 RETURN
```

Figure 2. BBC.

```
6A00 :A9C8A0FEA20120F4,4C6
6A08 :FF20616C20486DC9,38A
6A10 :31F000C934F0E9C9,4C8
6A18 :35F0064C0C6A4C47,280
6A20 :6AA90C20E3FFA9E8,482
6A28 :A000A2FF20F4FFA9,4FD
6A30 :03A20020F4FFA902,363
6A38 :A20220F4FFA9C8A0,4C8
6A40 :FEA20020F4FF60A9,48C
6A48 :0C20E3FF20F768A9,439
6A50 :15A20120F4FFA080,3E8
6A58 :A9FF8899056FD0FA,507
6A60 :A915A20120F4FF20,394
6A68 :0C6C90F8200C6C80,348
6A70 :F8A0008477847884,416
6A78 :79847A847B057020,380
6A80 :0560A57029F0C900,489
6A88 :D0E2200C6C80D899,468
6A90 :7100C020056DC009,364
6A98 :D0F8A000A5742900,422
6AA0 :D008A51C857618A5,354
6AA8 :1065738577200C6C,289
6AB0 :D00520E3FFC82005,524
6AB8 :6DC01809F0A57320,435
6AC0 :826D200C6C80A0C5,3CC
6AC8 :7AF000A95020E3FF,478
6AD0 :20E7FF4C676A200C,34F
6AD8 :6C800CC57DF000A9,48C
6AE0 :5020E3FF20E7FF4C,4AC
6AE8 :676AA573A0B9056F,43E
6AF0 :D00E20E7FFA90020,380
6AF8 :E3FF4C836B4C676A,469
6B00 :A000847A847B200C,2C9
6B08 :6C00F29176200560,477
6B10 :C0C475D0F1200C6C,45A
6B18 :00E3C57AF000A950,4CE
6B20 :20E3FF20E7FF4C67,488
6B28 :6A200C6C80CFC578,3C1
6B30 :F000A95020E3FF4C,447
6B38 :676A20C76820E7FF,429
6B40 :A573A0A90099056F,3F6
6B48 :A58AC90200582007,419
6B50 :6BA9C820056CA955,388
6B58 :20306EA95020556C,298
6B60 :A915A20120F4FF20,394
6B68 :F768A471C8008905,385
6B70 :6FD0519800F7A90C,4A4
6B78 :20E3FF20A56DA95A,437
6B80 :0582A96F8503A907,307
6B88 :20006E20F06D20A8,2D8
6B90 :6DA90520006EA908,2DA
6B98 :20E3FF20F06DA902,502
6BA0 :20E0FF4C0C6AA955,38F
6BA8 :20306EA99620556C,20E
6BB0 :4C6A6BA475200C6C,202
6BB8 :8000FA200C6C200C,316
6BC0 :6C4C4B6B4C6C6AA9,336
6BC8 :2020E3FFA96F20E3,430
6BD0 :FFA96B20E3FF60A9,51E
6BD8 :9CA000A6BAE002D0,41E
6BE0 :0BA21320F4FFA212,387
6BE8 :20F4FF60A29723F4,4C0
6BF0 :FFA29620F4FF60A9,553
6BF8 :9CA000A6BAE002D0,41E
6C00 :EBA25320F4FFA252,4E7
6C08 :20F4FF6018A99605,44F
6C10 :8F847EA991A20020,38D
6C18 :F4FF0009C007D005,440
6C20 :6B604C0C6AA47E20,2D4
6C28 :496CC68FD0023860,374
6C30 :A58AC902D0062079,369
6C38 :AE80EC60A991A201,447
6C40 :20F4FF90A47E800F,35C
6C48 :600AA2D2CAE0CAD0,5AA
6C50 :F8AA60A900047EA8,458
6C58 :20496C0D00FAA47E,449
6C60 :60A9E0A000A2FF20,452
6C68 :F4FFA90005BAA90C,460
6C70 :20E3FF20A86DA904,3E4
6C78 :20006EA9090502A9,2F0
6C80 :6F0503A00020F86D,39C
6C88 :20156DC941F008C9,370
6C90 :42F011C943F0174C,3A2
6C98 :616CA900A20120F4,335
6CA0 :FF4C876CA900A203,3C4
6CA8 :20F4FF4C876CA908,433
6CB0 :A20420F4FFE6BAA5,4CE
6CB8 :7C20E3FFA47E20A8,468
6CC0 :6DA90020006E20F0,2C4
6CC8 :6DA01720156DC941,2D0
6CD0 :F008C942F011C943,413
6CD8 :F0174C616CA907A2,372
6CE0 :0120F4FF4C096DA9,37F
6CE8 :07A20320F4FF4C09,314
6CF0 :6DA907A20420F4FF,3D6
6CF8 :E6BAA50AC7D0D009,443
6D00 :A9E0A000A20120F4,3E8
6D08 :FFA57C20E3FF2053,495
6D10 :6C20536C6020A86D,2E3
6D18 :A90520006E20F86D,2C1
6D20 :20A86DA90520006E,274
6D28 :20F86D20A86DA905,368
6D30 :20006E20F86D20A8,2DE
6D38 :6D847EA90320006E,2A9
6D40 :A9D220E0FF057C60,4D9
6D48 :A90C20E3FF20A860,3EF
6D50 :A90720006EA99A05,306
6D58 :02A96E0503A00020,361
6D60 :F86D20A86D20996D,3C0
6D68 :20996D20996D20A8,317
6D70 :6DA90A20006E20F0,2C6
6D78 :6020A86DA9022000,278
6D80 :6E20F86D20A86D20,348
6D88 :E7FFA9D220E0FF40,5A8
6D90 :A90FA20020F4FF60,3D5
6D98 :6DA90020006E20F0,287
6DA0 :6D20A86D6020A86D,33A
6DA8 :20A86D20E7FF20E7,445
6DB0 :FF604829F06A6A6A,3FE
6DB8 :6A0930C93A300310,1F1
6DC0 :690720E3FF60290F,312
6DC8 :0930C93A30031069,1F0
6DD0 :0720E3FF60457085,3AE
6DD8 :78A200A5782A900C,308
6DE0 :A57B4900857BA57A,390
6DE8 :4918857A267A267B,299
6DF0 :CAD0E06020E3FFC8,5AC
6DF8 :8102C900D0F6C860,4F7
6E00 :867DAAA92020E3FF,47B
6E08 :CAD0FAA67D60C97F,55F
6E10 :D008A90620F4FFE0,4FD
6E18 :00F012A97FC92080,3C3
6E20 :0EC90AF00AC90DF0,3A1
6E28 :06C907F002A90060,2D1
6E30 :857C867D847EA991,440
6E38 :A20120F4FFA903A2,404
6E40 :0720F4FFA996A200,403
6E48 :20F4FF902902F0F4,48A
6E50 :A47CA997A20920F4,41F
6E58 :FFA903A20420F4FF,464
6E60 :A991A20020F4FF80,49F
6E68 :09C007D00568604C,2C1
6E70 :0C6AA57CA67DA47E,3DC
6E78 :60847E867DA996A2,446
6E80 :0020F4FF902901F0,3CD
6E88 :08A996A20920F4FF,400
6E90 :9818900130A67DA4,340
6E98 :7E60444F574E4C4F,281
6EA0 :4144494E47204D45,215
6EA8 :4E55003120202052,193
6EB0 :4543454956450034,1F2
6EB8 :2020205345542042,1AE
6EC0 :6175642052617465,2E6
6EC8 :0035202020455049,180
6ED0 :5420544F20424153,20D
6ED8 :49430D454E544552,217
6EE0 :204E554D42455200,1F6
6EE8 :2020555345204354,1EC
6EF0 :524C204720544F20,1F5
6EF8 :52455455524E2054,254
6F00 :4F204D454E552029,1ED
6F08 :0053455420545241,208
6F10 :4E534D4954204261,24E
6F18 :7564205261746500,292
6F20 :4120202037352042,16F
6F28 :6175640D42202033,1FC
6F30 :3030204261756400,209
6F38 :4320313230302042,188
6F40 :6175640053455420,253
6F48 :5245434549564520,223
6F50 :4261756420526174,2C3
6F58 :650050524F475241,230
6F60 :4D20204C4F414445,1F2
6F68 :4420206F6B0D5052,20D
6F70 :45535320414E5920,213
6F78 :4B455920464F5220,218
6F80 :4D454E550D202020,1A2
```

Figure 1. Spectrum.

```
5 REM SPECTRUM 48k          fig 1
10 REM Hex Code Loader
15 CLEAR 59000
20 POKE 23658,8: CLS : PRINT
30 INPUT "Start Address ";a
50 IF a>61135 THEN GO TO 280
60 IF a<60000 THEN GO TO 20
70 PRINT a;
80 INPUT " :";b$
85 IF b$="END" THEN GO TO 280
90 IF LEN b$<>20 THEN GO TO 260
100 LET t=a-256*INT (a/256)
110 FOR n=0 TO 7
120 LET x$=b$(2*n+1 TO 2*n+1)
125 GO SUB 300: LET y=x
130 IF e=1 THEN GO TO 260
140 LET x$=b$(2*n+2 TO 2*n+2)
145 GO SUB 300: LET y=y*16+x
150 IF e=1 THEN GO TO 260
170 POKE a,y: LET a=a+1
180 LET t=t+y: NEXT n: LET y=0
190 FOR m=1 TO 3
200 LET x$=b$(17+m TO 17+m)
205 GO SUB 300: LET y=y*16+x
210 IF e=1 THEN LET a=a-1: GO TO 260
220 NEXT m
230 IF t=y THEN PRINT ":";b$: GO TO 50
240 PRINT "Checksum Error"
250 LET a=a-8: GO TO 50
260 PRINT "Typing Error"
270 LET a=8*INT (a/8): GO TO 50
280 SAVE "download"CODE 60000,1136
290 POKE 23658,0: STOP
300 LET e=0: LET x=CODE x$-48-7*(x$>"9")
310 IF x<0 OR x>15 THEN LET e=1
320 RETURN
```

Figure 2. Spectrum.

```
60000 :CD15EDC307ECCD15,4C7
60008 :EDCD36ECCD66EDCD,631
60016 :30EDCD47EE30F0CD,5AF
60024 :80EDFE31CA99EAFE,69A
60032 :35CA07EAC366EACD,5D0
60040 :15ED3EFACD04EDCD,5FD
60048 :15EDC9CD15EDC366,553
60056 :EACD66ED11E5EE06,58C
60064 :003EFF121310FCCD,458
60072 :15EE11CDEE06173E,3D2
60080 :20121310FCCD1FED,3DA
60088 :30F0CD50EDCD1FED,588
60096 :30F03265EF3E0032,3E9
60104 :6CEF326FEF3270EF,544
60112 :3A65EFCDE0EC3A65,5A1
60120 :EFE6F0FE0020DE0E,627
60128 :091165EFCD1FEDDA,501
60136 :AAEA1312CDE0EC0D,552
60144 :20F23A69EFE60020,51A
60152 :0021485C3A60EF0E,36C
60160 :004709226DEF0E00,1DA
60168 :11CDEECD1FED389A,47F
60176 :12130CCDE0EC79FE,45C
60184 :1020F03A60EFCD01,447
60192 :ECCD1FEDDAAAEA21,574
60200 :6FEF0E20133E5011,326
60208 :E0EE12133E0012CD,340
60216 :07ECCDA6ECC3AAEA,681
60224 :CD1FEDDAAAEA2170,518
60232 :EFBE20E121E5EE3A,524
60240 :60EF856F3E000C67,3CC
60248 :3E000E2000CD07EC,40F
60256 :3E2132005CC3FFE8,482
60264 :3E00326FEF3270EF,3C7
60272 :ED5860EF0E00CD1F,40C
60280 :EDDAAAEA3273EFCD,634
60288 :EBEC3A68EFFE0020,506
60296 :053A69EFE6003A73,432
60304 :EF12130C3A6AEF89,3FC
60312 :200CCD1FEDDAAAEA,5D8
60320 :216FEF0EC22DE0CD,584
60328 :1FEDDAAAEA2170EF,5A2
60336 :0EC22DE03E6F32E2,509
60344 :EE3E6032E3EE3E00,490
60352 :32E4EE3A005CFE21,501
60360 :2003CD15EECD07EC,553
60368 :CDA6EC21E5EE3A68,5C5
60376 :EF056F3E000C6736,422
60384 :0021E5EEED4B66EF,561
60392 :0C7EFE00C280EA23,4FC
60400 :0D20F63EFACD04ED,5B9
60408 :3E01D3FEC366EACD,5E8
60416 :1FED30F0C30DEAF3,594
60424 :0603AFD3FF10FD3E,308
60432 :40D3FF3EFFD3FF3E,56F
60440 :31D3FF3E0F320F5C,385
60448 :320D5C32405C3E01,250
60456 :D3FE21915CC09EF8,568
60464 :CD50EDC366EACD15,52F
60472 :EECD66ED3E01D3FE,556
60480 :2165EE3E00CD0FEC,442
60488 :CD04ECCDA3ECCDA6,654
60496 :EC23CD77ECCD77EC,58F
60504 :CDA0ECCD04ECCDA6,661
60512 :EC233E0DCD0FECCD,4CF
60520 :04EC23CDA3EC3E03,498
60528 :CD0FECCD04ECC9CD,608
60536 :A3EC3E07CD0FECCD,561
60544 :04EC23C97EFE00C8,528
60552 :CD08ED23C304ECFE,651
60560 :00C8F53E20CD08ED,528
60568 :F13DC30FECCDA0EC,65D
60576 :CDA3ECCDA6EC3E0D,5A6
60584 :CD08ED3EFF320C5C,574
60592 :C9F513E6F0CB1FCB,60C
60600 :1FCB1FCB1FF630FE,4CF
60608 :3AFAC6ECC6071213,498
60616 :F1E60FF630FE3AFA,606
60624 :04ECC6071213C921,46C
60632 :CDEEE5CD04ECE106,69C
60640 :173E20772310FC3E,339
60648 :0077C9E52170EFAE,538
60656 :77C50E087EA7CB17,449
60664 :30007EEE00773A6F,3C9
60672 :EFEE10326FEF3721,3D5
60680 :6FEFCB1623CB160D,358
60688 :20E2C1E1C9110501,394
60696 :216A00CD0503C93E,32F
60704 :963277EFCD47EDDA,529
60712 :2EEDF1C366EACDAC,5C0
60720 :ED70E601F602D3FE,548
60728 :AF2177EF35200237,2FC
60736 :C9CD77ED30E0C9CD,5F0
60744 :47EED0FEC0C037C9,5E6
60752 :F5D0FF3A01EFFE00,5C7
60760 :20043E3610023E37,187
60768 :D3FFD07FF1C9F53A,675
60776 :01EFFE0020043E36,376
60784 :D3FFCD50EDF1C93E,644
60792 :00D0FFE60037C8D0,59.
60800 :FFE60237C0D0FFE6,626
60808 :302004D07FA7C93A,3E8
60816 :01EFFE0020043E37,397
60824 :10023E36D3FFD07F,452
60832 :C9CD47ED3A73EFD0,5DE
60840 :F1C366EAF53ED230,5EE
60848 :20FDF1C9CDACED30,62A
60856 :20FAC9C5D5E5F5FE,70D
60864 :7F2013CDF9EDFE0C,537
60872 :200CFE0D20053E20,20A
60880 :D73E0DD718103E20,34F
60888 :D73E08D73A085CFE,4E8
60896 :2120033E08D73E5F,2E6
60904 :073E08D7F1E1D1C1,640
60912 :C9FE07201CFEC820,4F3
60920 :19FE0C2014FE0820,388
60928 :10FE0D200CFE20FA,367
60936 :0FEEFE00FA11EE3E,48A
60944 :00C93E07C9CD6B0D,32C
60952 :3E02CD01163E1832,1C4
60960 :095CC93E121601CD,302
60968 :1122C93E121600CD,257
60976 :1122C9C5D5E53E02,3E8
60984 :CD0116CD47EE30F8,451
60992 :CD5CEEE1D1C1C93A,5CD
61000 :385CCB6F200C3A00,20F
61008 :5CF5213B5CCBAEF1,4C3
61016 :A7C937C9F5111000,30E
61024 :CD10EDF1C9444F57,4D6
61032 :4E4C4F414449 4E47,284
61040 :204D454E55003120,216
61048 :2020524543454956,276
61056 :4500352020204578,217
61064 :697420746F204261,328
61072 :7369630020205573,2DF
61080 :652053796D626F6C,393
61088 :2053686966742020,300
61096 :204700746F205265,2C9
61104 :7475726E20746F20,39C
61112 :4D454E5520290045,27B
61120 :4E544552204E554D,309
61128 :4245522000000000,1C1
```

SPACE JUNK

At last, 80,000 characters after blast off, the good ship Space Junk reaches its final destination. Nalin Sharma explains.

HERE IS a reminder of the loading and game instructions for Space Junk.

Insert cassette, press Shift and Run/Stop and start your cassette recorder. Loading time is about two minutes. Put your joystick into Port 2.

Can you retrieve all 32 satellites by mastering control of your ship, which can move up, down, left and right and can also fire bullets?

However, beware of the four yellow junkies which patrol the skies. Unless you can work out how to destroy them you're in trouble! To help you there's a radar at the top of the screen which will pinpoint the junkies and any miscellaneous junk which appears from time to time and can be retrieved for bonus points.

After every two sheets you'll get an extra life and an attempt at the challenge stage. Here you have 99 units of time to turn the four junkies into stormer — if you succeed you'll get 8000 points! Below your score is shown the number of satellites left to collect, together with the number of lives left.

Pressing F7 will freeze the game and pressing the Space-Bar will restart it. Tape copies of the program are available for £3.25 from Nalin Sharma, 35 Kitchener Road, Walthamstow, London E17 4LJ.



7328:	ff00101020202020	19f	74e0:	0404040404040404	020	7698:	464d494d49464946	247	7850:	1010040202080402	036	7a10:	1d1d191919191d1d	0d8
7330:	0808040404040404	028	74e8:	0404040404040404	020	76a0:	4d494d4946494249	246	7858:	0208101004020208	03a	7a18:	1d1d191919191d1d	0d8
7338:	0404040404040404	020	74f0:	0404040404040404	020	76a8:	4249424942494249	22c	7860:	0402020810100402	036	7a20:	1d1d191919191d1d	0d8
7340:	0404040404040404	020	74f8:	0404040404040404	020	76b0:	4249424942494249	22c	7868:	0208040202081010	03a	7a28:	1d1d191919191d1d	0d8
7348:	0404040202020202	016	7500:	0404040404040410	02c	76b8:	4249424942494249	22c	7870:	0402020206080804	024	7a30:	1d1d191b191b191b	0d6
7350:	0202020202020204	012	7508:	1010101010101010	080	76c0:	4249424942494649	230	7878:	0202020608080402	022	7a38:	191b181918191819	0c7
7358:	1008100404081004	054	7510:	1010104080adff00	29c	76c8:	0046490046490046	164	7880:	0202060808040202	022	7a40:	1819181918191819	0c4
7360:	0408100402020810	03c	7518:	ff00ff00bd000000	2bb	76d0:	4900464900464900	167	7888:	0206080804020202	022	7a48:	1819191b1d1e191b	0d4
7368:	0402020810020202	026	7520:	0000000000004800	048	76d8:	4649004649004649	1ad	7890:	0608080402020206	026	7a50:	1d1e191b1d1e2500	0cf
7370:	0208100202020208	02a	7528:	4900480049004800	122	76e0:	0046490046490046	164	7898:	0808040404040404	028	7a58:	6101010101010101	068
7378:	1002020202081008	038	7530:	4900480049004849	16b	76e8:	4900464849000000	120	78a0:	0404040404040404	020	7a60:	0101010108080808	024
7380:	0404040418040202	030	7538:	4900484949004849	1b4	76f0:	4648490000004648	165	78a8:	0404040404040404	020	7a68:	0808080808080808	040
7388:	0202040202040202	014	7540:	490000494900004b	126	76f8:	4900000000000000	049	78b0:	0404040404040404	020	7a70:	0808080808080808	040
7390:	0404040414100404	03c	7548:	0048000046484800	11e	7700:	0061ff00ff2cff00	38a	78b8:	0404040408040408	028	7a78:	0404040404040404	020
7398:	0202020204020204	014	7550:	4649464946494946	23c	7708:	ff00ff3cff2cbf00	424	78c0:	0404080404080404	028	7a80:	0404040404040404	020
73a0:	0404020202060404	01c	7558:	4946494649464949	23f	7710:	2f00101010101010	08f	78c8:	0804040804040804	02c	7a88:	0404040408080808	030
73a8:	0202020204041004	02c	7560:	4649464946494649	23c	7718:	1010040404040404	038	78d0:	0408040408040408	02c	7a90:	0808080808081010	050
73b0:	0410080404040404	030	7568:	4946494649464946	23c	7720:	0404040404040404	020	78d8:	0404080404080202	024	7a98:	1010101010101010	080
73b8:	0404040404040404	020	7570:	4949464946494649	23f	7728:	0404040202080402	01e	78e0:	0c10101002020c10	05c	7aa0:	1010101010100404	068
73c0:	0404040404040404	020	7578:	4649494649464946	23c	7730:	0208040202080802	024	78e8:	101002020c101010	060	7aa8:	0404040404040404	020
73c8:	0404040404040404	020	7580:	4946494946494649	23f	7738:	0204040404041010	036	78f0:	1010101080ff00ff	2be	7ab0:	0404100404040404	02c
73d0:	0404040404040404	020	7588:	4649464949464946	23c	7740:	0402020804040404	020	78f8:	00ff00ff00ff00d3	3d0	7ab8:	0404040404040410	02c
73d8:	0404040404040404	020	7590:	4946494649494649	23f	7748:	0402020404040404	01c	7900:	ff20ff00ff2c1919	37b	7ac0:	0404040404040404	020
73e0:	0404040404040404	020	7598:	4649494649464946	23c	7750:	0404020204040404	01c	7908:	191919191d1d1919	0d0	7ac8:	0404040410040404	02c
73e8:	0404040404040404	020	75a0:	4649464949464946	23c	7758:	0404040202040404	01c	7910:	1d1d19191d1d191d	0dc	7ad0:	0404040404040404	020
73f0:	0404040404040404	020	75a8:	4946464946494946	23c	7760:	0404040402020404	01c	7918:	191d191d191d191d	0d8	7ad8:	0410040404040404	02c
73f8:	0404040404040404	020	75b0:	4946494646494649	23c	7768:	0404040404020204	01c	7920:	191d191d191d191d	0d8	7ae0:	0404040404041004	02c
7400:	0404040402020202	018	75b8:	4946494649464649	23c	7770:	0404040404040202	01c	7928:	191d191d191d1919	0d4	7ae8:	0404040404040404	020
7408:	0202020204020202	012	75c0:	4649494649464946	23c	7778:	0404040404040402	01e	7930:	19191d1d1d1d001d	0c3	7af0:	0404041004040404	02c
7410:	0208080808040202	02a	75c8:	4649464949464946	23c	7780:	0204040404040404	01e	7938:	0000000019000000	019	7af8:	0404040404040404	020
7418:	0202020202020402	012	75d0:	494646494d494d4d	24e	7788:	0202040404020204	018	7940:	1919000019191919	096	7b00:	0404040404040404	020
7420:	0202020808080804	02a	75d8:	494d494d494d4949	254	7790:	0404040202040402	01a	7948:	1d1d19191d1d1919	0d8	7b08:	0404040404040404	020
7428:	0202020202020202	010	75e0:	4d494d4d494d494d	25c	7798:	0204040404020204	01a	7950:	1d1d1919161d1d19	0d5	7b10:	0404040404040404	020
7430:	0402020202080404	01c	75e8:	494d49494d494d4d	258	77a0:	0402020404040402	01a	7958:	191d1d19191d1d19	0d8	7b18:	0404040404040404	020
7438:	0804040402020202	01c	75f0:	494d494d494d4949	254	77a8:	0204040202040404	01a	7960:	19161d1d19191d1d	0d5	7b20:	0404040410101010	050
7440:	0202020204020202	012	75f8:	4d494d4d494d494d	25c	77b0:	0402020404020204	018	7968:	19191d1d1919161d	0d1	7b28:	1010101010100202	064
7448:	0208080808040202	02a	7600:	494d49494d494d4d	258	77b8:	0404040202040402	01a	7970:	1d19191d1d19191d	0d8	7b30:	0e0e101010101010	07c
7450:	0202020202020402	012	7608:	494d494d494d4949	254	77c0:	0204040404020204	01a	7978:	1d1919161d1d1919	0d1	7b38:	1010101002020e0e	060
7458:	0202020808080804	02a	7610:	4d494d4d494d494d	25c	77c8:	0404020204020202	016	7980:	1d1d19191d1d1919	0d8	7b40:	0404040404040404	020
7460:	0202020202020202	010	7618:	494d494942424b42	239	77d0:	0204020204040202	016	7988:	161d1d19191d1d19	0d5	7b48:	0404040404040404	020
7468:	0402020202080404	01c	7620:	424b42424b42424b	22b	77d8:	0402020202040202	014	7990:	191d1d1919161924	0d8	7b50:	0404040404040404	020
7470:	0804040404080202	024	7628:	42424b42424b4242	222	77e0:	0404020204020202	016	7998:	1924192419241924	0f4	7b58:	0404040404040404	020
7478:	0202020208020202	016	7630:	4b42424b42424b42	22b	77e8:	0204020204040202	016	79a0:	1924192419241924	0f4	7b60:	0404040404040404	020
7480:	0202020802020202	016	7638:	424b42424b42424b	22b	77f0:	0402020202040202	014	79a8:	1924192419241924	0f4	7b68:	0404040404040404	020
7488:	0202080404040802	022	7640:	4244494942444949	230	77f8:	0404020204020202	016	79b0:	1924192419241924	0f4	7b70:	0404040404040404	020
7490:	0202020202080202	016	7648:	0000424449494244	19e	7800:	0204020204040202	016	79b8:	1924192419241924	0f4	7b78:	0404040404040404	020
7498:	0202020208020202	016	7650:	4949000042444949	1aa	7808:	0402020202040202	014	79c0:	1924192419240000	0b7	7b80:	0404040404040404	020
74a0:	0202020804040408	022	7658:	4244494900004244	19e	7810:	02020c02020c0202	024	79c8:	1616000016160000	058	7b88:	0404040404040404	020
74a8:	0202020202020802	016	7660:	4949424449490000	1aa	7818:	0c02020c02020c02	02e	79d0:	1d16161600001616	08b	7b90:	0808080808080808	040
74b0:	0202020202080202	016	7668:	4244494942444949	230	7820:	020c02020c02020c	02e	79d8:	0000161600001d16	05f	7b98:	0808080808080808	040
74b8:	0202020208040404	01c	7670:	0000424449494244	19e	7828:	02020c02020c0202	024	79e0:	1616191919191d1d	0ca	7ba0:	0808080808080808	040
74c0:	0802020202020208	01c	7678:	49490000464d494d	1bb	7830:	0c02020c04020208	02c	79e8:	1d1d191919191d1d	0d8	7ba8:	1010101010101010	080
74c8:	0202020202020802	016	7680:	494649464d494d49	24a	7838:	0402020810100402	036	79f0:	1d1d191919191d1d	0d8	7bb0:	1010101040800101	102
74d0:	0202020202080404	01a	7688:	4649464d494d4946	247	7840:	0208040202081010	03a	79f8:	1d1d191919191d1d	0d8	7bb8:	0101010101010101	008
74d8:	0404040404040404	020	7690:	49464d494d494649	24a	7848:	0402020804020208	020	7a00:	1d1d191919191d1d	0d8	7bc0:	010181af90ae81ef	3e0
									7a08:	1d1d191919191d1d	0d8			

Program 1.

```
10 REM *********************************
20 REM ***** BACK UP UTILITY *****
30 REM ***** K.R.LASLETT 1985 *****
40 REM *********************************
50 ON BREAK GOSUB 500
60 INK 0,0:INK 1,26:INK 2,6:INK 3.24
70 BORDER 0:PAPER 0:PEN 1:ORIGIN 0,0:CLS
80 LOCATE 1,25:PRINT"LOADING PLEASE WAIT!"
90 REM ****TAPE****
100 PLOT 120,90:DRAW 120,100,1:DRAW 170,100:DRAW 170,9
0:DRAW 250,90:DRAW 250,80:DRAW 230,80:DRAW 230,77:DRAW
 250,77:DRAW 250,70:DRAW 230,70:DRAW 230,67:DRAW 250,6
7:DRAW 250,60:DRAW 200,60:DRAW 200.50:DRAW 190.50:DRAW
 190,60:DRAW 180,60:DRAW 180,70
110 DRAW 170,70:DRAW 170,60:DRAW 160,60:DRAW 160,90:DR
AW 150,90:DRAW 150,60:DRAW 140,60:DRAW 140,90:PLOT 160
,90:DRAW 170,90:PLOT 170,80:DRAW 180,80:DRAW 180,77:DR
AW 170,77:DRAW 170,80:PLOT 200,80:DRAW 210,80:DRAW 210
,77:DRAW 200,77:DRAW 200,80
120 PLOT 190,90:DRAW 190,60:PLOT 220,90:DRAW 220,60:PL
OT 140,90:DRAW 120,90
130 REM ****TO****
140 PLOT 280,90:DRAW 340,90:DRAW 340,60:DRAW 310,60:DR
AW 310,90:PLOT 310,80:DRAW 300,80:DRAW 300,60:DRAW 290
,60:DRAW 290,80:DRAW 280,80:DRAW 280,90:PLOT 320,80:DR
AW 330,80:DRAW 330,77:DRAW 320,77:DRAW 320,80
150 REM ****TAPE2****
160 PLOT 360,100:DRAW 410,100:DRAW 410,90:DRAW 490,90:
DRAW 490,80:DRAW 470,80:DRAW 470,77:DRAW 490,77:DRAW 4
90,70:DRAW 470,70:DRAW 470,67:DRAW 490,67:DRAW 490,60:
DRAW 440,60:DRAW 440.50:DRAW 430.50:DRAW 430,60:DRAW 4
20,60:DRAW 420,70:DRAW 410,70
170 DRAW 410,60:DRAW 400,60:DRAW 400.90:DRAW 390,90:DR
AW 390,60:DRAW 380,60:DRAW 380,90:DRAW 360,90:DRAW 360
,100:PLOT 400,90:DRAW 410,90:PLOT 410,80:DRAW 420,80:D
RAW 420,77:DRAW 410,77:DRAW 410,80:PLOT 430,90:DRAW 43
0,60:PLOT 460,90:DRAW 460,60
180 PLOT 440,80:DRAW 450,80:DRAW 450,77:DRAW 440,77:DR
AW 440,80
190 REM ****CASSETTE****
200 PLOT 90,320:DRAW 100,330:DRAW 290,330:DRAW 300,320
:DRAW 300,210:DRAW 290,200:DRAW 100,200:DRAW 90,210:DR
AW 90,320:PLOT 120,200:DRAW 130,230:DRAW 260,230:DRAW
270,200:
210 PLOT 150.220:DRAW 158,220:DRAW 158,213:DRAW 150,21
3:DRAW 150.220:PLOT 240,220:DRAW 240,213:DRAW 232.213:
DRAW 232,220:DRAW 240,220:PLOT 170,287:DRAW 220,287:DR
AW 220,275:DRAW 170,275:DRAW 170,287
220 PLOT 330,320:DRAW 340,330:DRAW 530,330:DRAW 540,32
0:DRAW 540,210:DRAW 530,200:DRAW 340,200:DRAW 330,210:
DRAW 330,320:PLOT 360,200:DRAW 370,230:DRAW 500,230:DR
AW 510,200:PLOT 390,220:DRAW 398,220:DRAW 398,213:DRAW
 390,213:DRAW 390,220
230 PLOT 480,220:DRAW 480,213:DRAW 472,213:DRAW 472,22
0:DRAW 480,220:PLOT 410,287:DRAW 460,287:DRAW 460,275:
DRAW 410,275:DRAW 410,287
240 PLOT 100,310:DRAW 110,320,2:DRAW 280,320:DRAW 290.
310:DRAW 290,240:DRAW 100,240:DRAW 100,310:PLOT 340,31
0:DRAW 350,320:DRAW 520,320:DRAW 530.310:DRAW 530,240:
DRAW 340,240:DRAW 340,310
250 PLOT 140,290:DRAW 250,290:PLOT 250,260:DRAW 140.26
0:PLOT 380,290:DRAW 490,290:PLOT 490,260:DRAW 380,260
260 REM ****LOGO****
270 PLOT 70,340,3:DRAW 60,350:DRAW 60,380:DRAW 70,390:
DRAW 100,390:DRAW 110,380:DRAW 110,350:DRAW 100,340:DR
AW 70,340:PLOT 100,350:DRAW 80,350:DRAW 70,360:DRAW 70
.370:DRAW 80,380:DRAW 100,380:DRAW 100,370
```

AMSTRAD TAPE BA

How many times have you sat there waiting for what seems to be forever for a program to Load? Well type in this program and make back up copies of your slow loading software that will then Load at twice the normal speed. Alternatively, just make security copies at the reliable normal speed.

A problem that I have encountered with the Amstrad is the way in which the speed of cassette mechanisms vary from machine to machine. Some software will only successfully load one in three attempts which is another reason for making one or maybe two back up copies of that brand new game.

Software recorded on your machine will always be pin sharp and reliable to load successfully even at the fast rate. I generally make two copies of my valuable software, one on a C15 at the fast rate and the other on a C90 at normal speed, just in case.

To use the program type in program 1, check it and save it to tape with

SAVE "AMSTRAD BACK UP"

Now type in program 2, check it and again save it to tape with

SAVE "AMSTRAD BACK UP"

Lastly, type in program 3. Before running save the Basic to another cassette with

SAVE "Data"

Check it carefully then Run it. Insert your first tape with the first two programs on and Save the resulting code.

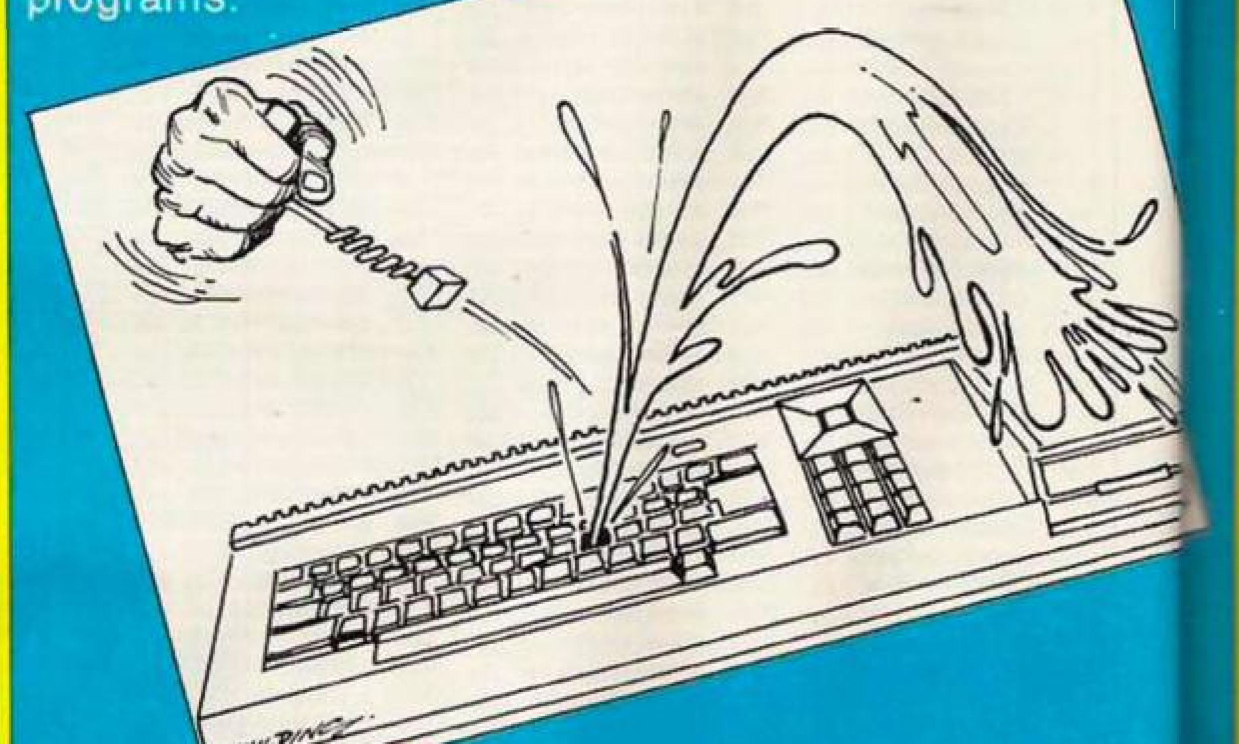
Reset computer with Ctrl/Shift/Escape. Rewind tape press Ctrl/small Enter and the program will auto run.

The program is user-friendly in that not many instructions are necessary. If all goes well in the loading the computer will beep at you, and ask Save Speed, just press 1 for Fast or 0 for Normal. You will now be presented with Press Play then any key: which is the standard message you see when you load any program. So why not rewind this tape and make a back up copy of this program just to test it? It copies a program section by section. This program is made up of three sections.

1st section 3 blocks
2nd section 1 block
3rd section 1 blocks

If all is going well, the bottom of the screen should read Loading Amstrad Back Up Block

KR Laslett with a quick and easy way to take extra copies of precious programs.



```
280 DRAW 80,370:DRAW 80,360:DRAW 100,360:DRAW 100,350:
PLOT 120,340:DRAW 120,390:DRAW 140,390:DRAW 140,380:DR
AW 150,390:DRAW 230,390:DRAW 240,370:DRAW 240,390:DRAW
 290,390:DRAW 300,380:DRAW 300,390:DRAW 310,390:DRAW 3
10,340
290 DRAW 290,340:DRAW 280,350:DRAW 280,340:DRAW 250,34
0:DRAW 250,370:DRAW 230,340:DRAW 210,380:DRAW 190,380:
DRAW 190,370:DRAW 200,370:DRAW 200,360:DRAW 190,360:DR
AW 190,350:DRAW 210,350:DRAW 210,340:DRAW 150,340:DRAW
 140,350
300 DRAW 140,340:DRAW 120,340:PLOT 170,390:DRAW 170,34
0:DRAW 150,365:DRAW 170,390:PLOT 210,390:DRAW 210,380:
PLOT [illegible]0,390:DRAW 250,370:PLOT 270,390:DRAW 270,340:PL
OT 330,340:DRAW 330,390:DRAW 350,390:DRAW 350,360:DRAW
 370,360
310 DRAW 380,390:DRAW 400,390:DRAW 410,360:DRAW 420,36
0:DRAW 410,370:DRAW 410,390:DRAW 470,390:DRAW 470,360:
DRAW 490,360:DRAW 490,390:DRAW 610,390:DRAW 610,370:DR
AW 600,370:DRAW 600,340:DRAW 580,340:DRAW 580,370:DRAW
 560,370
320 DRAW 560,340:DRAW 540,340:DRAW 540,370:DRAW 530,37
0:DRAW 530,380:DRAW 510,380:DRAW 510,370:DRAW 520,370:
DRAW 520,360:DRAW 510,360:DRAW 510,350:DRAW 530,350:DR
AW 530,340:DRAW 400,340:DRAW 400,350:DRAW 380,350:DRAW
 380,340
330 DRAW 330,340:PLOT 370,360:DRAW 370,340:PLOT 390,37
0:DRAW 380,360:DRAW 400,360:DRAW 390,370:PLOT 450,390:
DRAW 450,340:PLOT 450,350:DRAW 430,370:DRAW 450,370:PL
OT 410,360:DRAW 410,340:PLOT 490,360:DRAW 490,340:PLOT
 530,390:DRAW 530,380
340 PLOT 570,390:DRAW 570,370
350 REM ****ARROW****
360 PLOT 250,150:DRAW 270,165:DRAW 250,180:DRAW 350,16
5:DRAW 330,190:DRAW 380,165:DRAW 330,140:DRAW 350,165:
DRAW 250,150
370 REM ****CIRCLES****
380 PLOT 250,260:DRAW 250,260,2
390 FOR A=0 TO 67:DEG:ORIGIN 245,275:PLOT 16*COS(A),16
*SIN(A):NEXT:ORIGIN 0,0
400 FOR A=292 TO 360:DEG:ORIGIN 245,275:PLOT 16*COS(A)
,16*SIN(A):NEXT:ORIGIN 0,0
410 FOR A=0 TO 67:DEG:ORIGIN 485,275:PLOT 16*COS(A),16
*SIN(A):NEXT:ORIGIN 0,0
420 FOR A=292 TO 360:DEG:ORIGIN 485,275:PLOT 16*COS(A)
,16*SIN(A):NEXT:ORIGIN 0,0
430 FOR A=112 TO 257:DEG:ORIGIN 145,276:PLOT 16*COS(A)
,16*SIN(A):NEXT:ORIGIN 0,0
440 FOR A=112 TO 257:DEG:ORIGIN 385,276:PLOT 16*COS(A)
,16*SIN(A):NEXT:ORIGIN 0,0
450 r%=10:x%=150:y%=275:DEG:ORIGIN x%,y%:FOR i%=1 TO 4
5:a%=r%*COS(i%):b%=r%*SIN(i%):PLOT a%,b%,1:PLOT -a%,b%
:PLOT a%,-b%:PLOT -a%,-b%:PLOT b%,a%:PLOT -b%,a%:PLOT
b%,-a%:PLOT -b%,-a%:NEXT
460 r%=10:x%=240:y%=275:DEG:ORIGIN x%,y%:FOR i%=1 TO 4
5:a%=r%*COS(i%):b%=r%*SIN(i%):PLOT a%,b%,1:PLOT -a%,b%
:PLOT a%,-b%:PLOT -a%,-b%:PLOT b%,a%:PLOT -b%,a%:PLOT
b%,-a%:PLOT -b%,-a%:NEXT
470 r%=10:x%=390:y%=275:DEG:ORIGIN x%,y%:FOR i%=1 TO 4
5:a%=r%*COS(i%):b%=r%*SIN(i%):PLOT a%,b%,1:PLOT -a%,b%
:PLOT a%,-b%:PLOT -a%,-b%:PLOT b%,a%:PLOT -b%,a%:PLOT
b%,-a%:PLOT -b%,-a%:NEXT
480 r%=10:x%=480:y%=275:DEG:ORIGIN x%,y%:FOR i%=1 TO 4
5:a%=r%*COS(i%):b%=r%*SIN(i%):PLOT a%,b%,1:PLOT -a%.b%
:PLOT a%,-b%:PLOT -a%,-b%:PLOT b%,a%:PLOT -b%,a%:PLOT
b%,-a%:PLOT -b%,-a%:NEXT
490 PAPER 0:RUN"!"
500 ORIGIN 0,0:STOP
```

ACK—UP



1 etc, to Block 3. Afterwards, automatically the computer responds with Press Rec and Play then any key, which instructs you to place your back up tape into the machine, press appropriate buttons and any key.

A powerful feature on this program is the Save again option which when your three blocks have been Saved should appear on the bottom of the screen. Simply press Y for yes or N for no. Upon pressing Y the section will be Saved again, on pressing N the program will go back to Press Play then any key in which case carry on with the next section etc.

The program as it stands will transfer a section up to about 22 blocks in length which in most cases will be sufficient. You should become accustomed to this program very quickly as it's very easy to use and the screen always tells you what's going on.

If you get the message "read error a" or a similar message which tells you there's a tape loading error, don't despair press Escape, rewind the tape and load the section again. I've tried to make the program as crash-proof as possible ie, if Escape is pressed during Loading the program will call a routine to reset the cassette manager and call the load routine once more.

If the program hasn't operated as described then re-load the machine code loader, if you save it separately on a tape — program 3 — and check the data carefully. Then re-Save the resultant code. Then try again.

If anybody doesn't want the task of typing in the program, tape copies are available with full instructions from: Mr. K.R. Laslet, 12 Wintour House, Loweswater Close, Wembley HA9 8UF at £3.00 per copy. ■

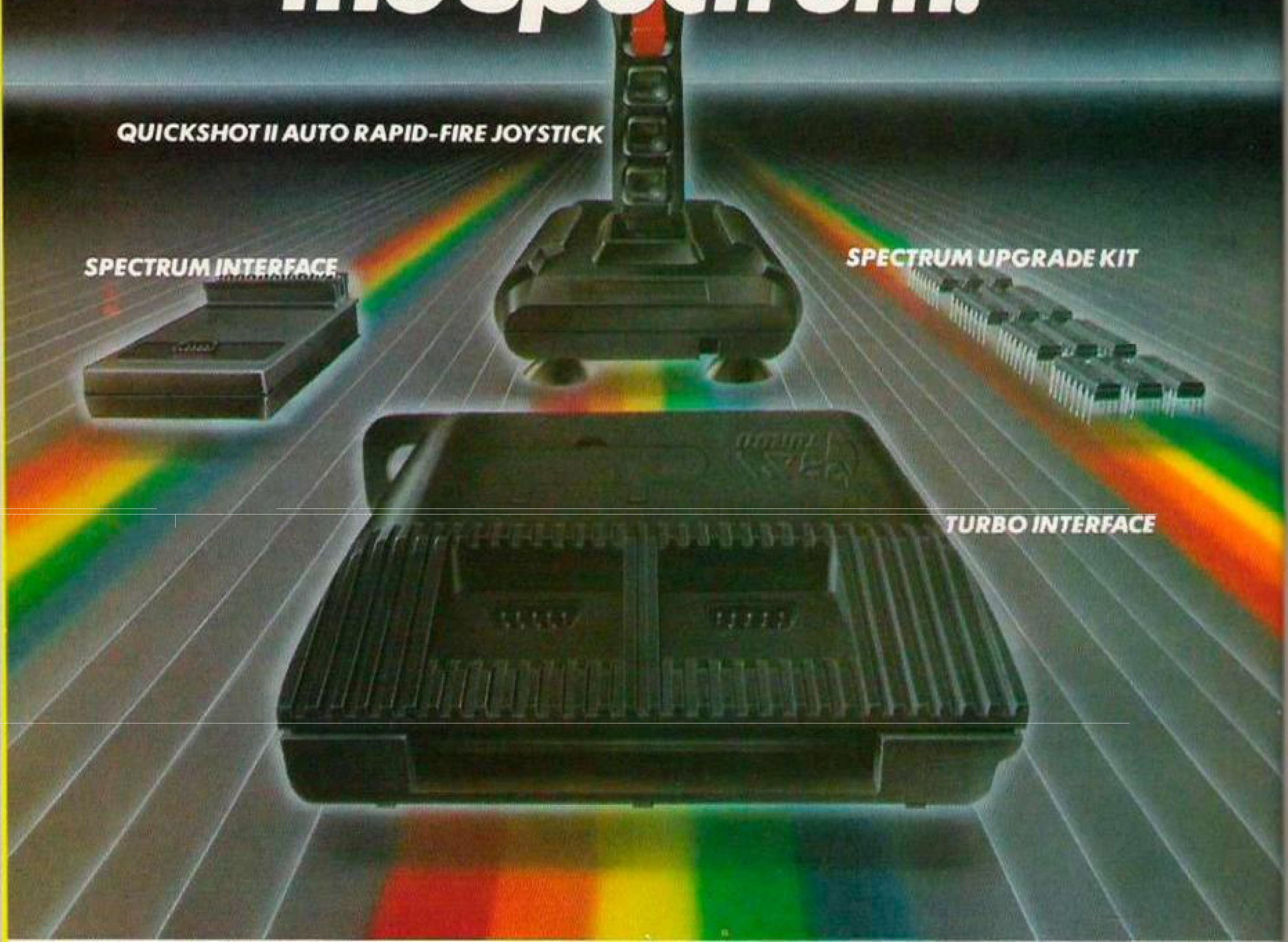
Program 2.

```
5 REM ********************************
10 REM ***** BASIC CONTROL PROGRAM ****
15 REM ********** K.R.LASLETT *********
20 REM ********************************
25 MEMORY 42999:LOAD"!"
30 WINDOW 1,40,24,25:CALL &BC65:CLS:PRINT CHR$(7):PRIN
T"INPUT SAVE SPEED":PRINT"0-NORMAL OR 1-FAST."
40 A$=INKEY$:IF A$="" GOTO 40
50 IF A$="1" THEN SPEED WRITE 1
60 CLS:PRINT CHR$(7):CALL 43000
70 CLS:PRINT CHR$(7):PRINT"SAVE AGAIN":PRINT"YES OR NO
"
80 B$=INKEY$:IF B$="" GOTO 80
90 IF B$="Y" OR B$="y" THEN 110
100 GOTO 60
110 CLS:PRINT CHR$(7):CALL &A823:GOTO 70
```

Program 3.

```
10 REM MACHINE CODE LOADER
20 MEMORY 42999
30 FOR address=43000 TO 43095
40 READ byte:POKE address,byte
50 NEXT address
60 SAVE"AMSTRAD BACK UP",B,43000,96
65 END
100  DATA &06,&00,&21,&E8,&03,&11,&28,&04
110  DATA &CD,&77,&BC,&D2,&4C,&A8,&22,&EA
120  DATA &03,&ED,&53,&EC,&03,&ED,&43,&EE
130  DATA &03,&32,&F0,&03,&21,&28,&0C,&CD
140  DATA &83,&BC,&D2,&4C,&A8,&22,&F1,&03
150  DATA &CD,&7A,&BC,&06,&10,&2A,&EA,&03
160  DATA &11,&28,&04,&CD,&8C,&BC,&D2,&52
170  DATA &A8,&22,&F3,&03,&21,&28,&0C,&ED
180  DATA &5B,&EE,&03,&ED,&4B,&F1,&03,&3A
190  DATA &F0,&03,&CD,&98,&BC,&D2,&52,&A8
200  DATA &CD,&8F,&BC,&C9,&CD,&7D,&BC,&C3
210  DATA &F8,&A7,&CD,&92,&BC,&C3,&F8,&A7
```

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TOP★ TIPS

LISTER

This short machine code program formats the listing so that each statement is printed on a new line and indented. Since Basic regards If . . . Then as two statements these are also separated.

The routine it can be saved to tape with:

SAVE "lister" 65368,66

To use the routine:

PRINT: RANDOMIZE USR address to LIST to the screen or by

PRINT = 3: RANDOMIZE USR address to send to the Printer.

Alan Mynett.

```
100 REM Hex Loader
120 RESTORE 1000
140 READ address,datalines
150 PRINT TAB 10;"Loading Code"
160 FOR n=1 TO datalines
170 READ a$: LET [illegible]
LET check=0
180 FOR i=1 TO 16 STEP 2
190 LET h$=a$(i TO i+1): GO SUB 300
200 POKE address,byte
210 LET address=address+1: LET check=check+byte
220 NEXT i
230 IF check<>VAL a$ THEN BEEP [illegible]
[illegible]
240 PRINT AT [illegible] "Line ";1000+[illegible] is correct": NEXT n
250 STOP
290 LET byte=0
300 FOR i=1 TO 2: LET byte=byte*16+CODE h$(i)-48-7*(h$(i)>"9")
NEXT i
310 RETURN
1000 DATA 65368,8
1010 DATA [illegible]
1020 DATA [illegible]
1030 DATA [illegible]
1040 DATA [illegible]
1050 DATA [illegible]
1060 DATA [illegible]
1070 DATA [illegible]
1080 DATA [illegible]
1090 DATA [illegible]
```

UTILITY PROGRAM

I find this short machine code program extremely useful when writing large programs involving printing control characters.

To enable the program, type SYS 5E4 (50000). This has to be typed after typing New because the IRQ vector is reset. This also occurs after pressing Run/Stop and Restore.

Matthew Wilkes.

```
100 RESTORE
110 FOR I=50000 TO 50012
120 READ D:POKE I,D
130 NEXT
140 FOR I=49152 TO 49197
150 READ D:POKE I,D
160 NEXT
170 REM TYPE 'SYS 5E4'
180 REM TO ENABLE
190 DATA120,169,0,141,20
200 DATA3,169,192,141,21
210 DATA3,88,96,32,159
220 DATA255,166,198,208,3
230 DATA76,49,234,202,189
240 DATA119,2,201,133,208
250 DATA0,169,0,141,212,0
260 DATA76,49,234,201,134
270 DATA240,3,76,49,234
280 DATA169,255,141,212
290 DATA0,169,0,141,198
300 DATA0,76,49,234
```

RESPONSE *Frame*

Do you have a problem related to your micro? Tim Hartnell will do his best to help. Please include only one question per letter and mark it "Response Frame". Alternatively, perhaps you have an idea you'd like to pass on to others. Why not write to us with your top tips?

'CHEQUE BOOK'

■ I recently bought an adventure game set in space for my Amstrad. The program used normal text printout, but all the numbers on the screen were like those seen at the bottom of cheques. I have looked all through the character set, including getting my Amstrad to printout the characters from 128 to 255, and I cannot find these "cheque numbers". How did the people who wrote the adventure do it?

Martin Wiaba,
Witham,
Essex.

IT IS LIKELY that the standard numbers in the Amstrad character set were redefined, using the Symbol command. The following routine, which you can use in combination with any programs, will produce numbers as requested by you.

```
10 REM "Cheque-book" numerals
20 SYMBOL AFTER 48
30 SYMBOL 48,0,60,66,66,98,98,98,60
40 SYMBOL 49,0,0,0,0,12,12,12,12
50 SYMBOL 50,0,124,2,2,60,96,96,62
60 SYMBOL 51,0,124,2,2,60,6,6,126
70 SYMBOL 52,0,64,96,100,100,126,4,4
80 SYMBOL 53,0,62,64,64,60,6,6,126
90 SYMBOL 54,0,62,64,64,124,70,70,126
100 SYMBOL 55,0,120,8,8,12,12,12,12
110 SYMBOL 56,0,60,66,66,60,70,70,60
120 SYMBOL 57,0,60,66,66,60,6,6,126
```

DRAGON BUG?

■ While writing a program on the Dragon 32, I came across a quite interesting messate. Error messages on the Dragon generally consist only of two letters, such as SN Error, but during the execution of one program I got two *words*. The Dragon was waiting for an ordinary input response, and I entered "Bill, Fred". The Dragon replied "Extra Ignored", and asked for the input again. It seems the Dragon ignores everything following the comma. I've tried everything else, such as semi-colons, but they do not work.

S J Lawton,
Barnsley,
South Yorkshire.

MANY COMPUTERS will behave in just the same way as your Dragon when presented with a comma within an input. You can only use this if you allow for more than one variable to be assigned with the word Input, as in:

INPUT "ENTER NAME"; A$, B$

If you do this, you'll find the computer will accept input separated by a comma, and will assign the material to the left of the comma to the first variable (A$) and the rest of the material to the second one (B$).

VAL ON THE QL

■ I have recently received a QL and am generally very pleased with it, having previously owned a BBC Model B and a 48K Spectrum. On trying to convert some Spectrum programs, I've discovered that omissions from SuperBasic make it fairly difficult. I know about coercion, but stil find I need Val on the QL. Is there any way of making a Val function? Lastly, is the JM the lastest version of the computer available? I have an AH version. Finally, could you tell me how long it takes to load Quill? I wish to know if my Microdrives are as fast as they should be.

S Tomasini,
Dartmouth,
Devon.

THE ONLY WAY to emulate Val on the QL is to make use of coercion, but *test* the output before printing the result on the screen. The material you are Valling should be of a predictable type, and you might find that adding, or subtracting, 0.5 gives the answer you want — and perhaps using INT as well.

The latest version of the QL out, at the time of going to press, is the JS, which is significantly better than JM, which is the version which immediately preceded it. It includes good error-trapping.

Version 1.1 of QDOS, in the JS Rom, runs Microdrives more quickly than the earlier version. However, because Quill itself has been progressively improved, the time it takes to load depends almost entirely on which Quill you have, rather than the speed with which your Microdrives work. The first version of Quill, on the first (kludged) QL's, took some 70 seconds to load. The time is now down to 20 or less.

DRIVE PROBLEM

■ I have a Sinclair Microdrive and several cartridges. After fairly heavy use of the cartridges, one started to act strangely. I got the message "Microdrive not present" when I tried to catalogue, load or save. The first time this happened, I thought it was a one-off, and threw away the cartridge. However, after buying a new one, the same thing happened after a couple of weeks. How can I get the information back?

P D Scott,
Crewe.

SINCLAIR ALWAYS advises users of the Spectrum to make backup copies of important programs. Whenever I am developing a major program on the Spectrum, I save and resave, using a name which ends with the number of the version I'm saving. I save the partially completed programs on two different cartridges, alternating the saves, so that if one goes down I still have a fairly recent version available. available.

It sounds to me as if you are giving your cartridges very heavy use. Perhaps you should make sure you do not use one exclusively from now on, and make back up copies frequently, on other cartridges. If you can borrow a second Microdrive, it would be worth trying to copy from your cartridge onto another one, placing your cartridge in the borrowed drive, rather than in your own drive.

Check that the edge connector on your Microdrive is completely clean, by rubbing it gently with an ordinary pencil rubber — and making sure bits of rubber don't get into the works!

In an earlier issue of Your Computer, *I gave a routine to simulate on the Spectrum the Left$, Right$ and Mid$ string-handling commands used in most other Basics. Andy Gibbons on Peterborough suggests that it is simpler if the Def FN function is used, and outlines the following simple implementations of the standard string-handling, to simplify program conversions:*

```
10 DEF FN L$ (A$,X) = A$ ( TO X): REM LEFT$
20 DEF FN R$ (A$, X) = A$ (X + 1 TO): REM RIGHT$
30 DEF FN M$ (A$, X, Y) = A$ (X TO (X + Y) - 1): REM MID$
```

SOFTWARE *File*

Programs for Software File should be fairly compact and sent on a cassette. Please include clear instructions and say what computer it's for. We pay between £6 and £36 for programs published. They must be double-checked and submitted

Vampire and priest

Adam Murray,
12 AD Regt.,
BFPO 20.

Amstrad

VAMPIRE AND PRIEST is a two-player game for the Amstrad CPC-464 and occupies just over 8K. It makes use of both sound and graphics with the latter being in Mode 0 — low resolution with 15 colours.

The game itself is written entirely in Amstrad Basic and is explained with the use of remark statements which can be left out when typing in the program.

Full instructions of how to play the game are provided within the program as is an option to change the skill level.

Provisions have been made for each player to use a joystick but with a few simple changes any keyboard/joystick layout is possible. This is how you do it.

Turn to appendix III page 16 of the user manual which should show a picture of the keyboard with appropriate values written on the individual keys.

Now look at lines 110 and 120. These hold the values of the keys to be used, and can be changed to your own choice. Initially they are set to use joysticks. The variable names are short but meaningful, e.g. VU% = key to use to move vampire up, PF% = key to use as fire for priest etc.

The routine between 560-630 is a simple fill routine and could be placed outside the program if the following parameters are passed: x%-X co-ord to start filling from. y%-Y co-ord to start filling from. c%- the colour to use in filling the area. In this case it must be the same as the outline of the shape. This could easily be changed to suite your own purposes.

I have used this routine to fill the church and castle at the start of the game and although slow does not need to be repeated after every game.

If all is well there should be a tuneful version of Greensleeves playing in the background. This is achieved simply by using the interrupts in the form of ON SQ(?) Gosub.

I think this program demonstrates what can be done with Locomotive Basic and without special techniques.

```
10 '****************************
20 '****    PRIEST AND VAMP. ****
30 '****        1985.        ****
40 '****       FOR THE       ****
50 '****  AMSTRAD CPC464.    ****
60 '****    WRITTEN   BY     ****
70 '****    ADAM MURRAY.     ****
80 '****************************
90 '
100 MODE 0
110 VU%=48:VD%=49:VL%=50:VR%=51:VF%=52
 'KEYS FOR VAMP
120 PU%=72:PD%=73:PL%=74:PR%=75:PF%=76
 'KEYS FOR PRIEST
130 no%=0:GOTO 180
140  no%=no%+1:IF no%=39 THEN RESTORE
160:no%=0
150 READ d%,n%:SOUND 1,n%,d%,15,1,4:RE
TURN
160 DATA 25,568,50,478,25,426,37,379,1
2,358,25,379,50,426,25,506,37,638,12,5
68,25,506,50,478,25,568,37,568,12,602,
25,568,50,506,25,602,50,758,25,568
170 DATA 50,478,25,426,37,379,12,358,2
5,379,50,426,25,506,37,638,12,526,25,5
06,37,478,12,506,25,568,37,606,12,677,
25,638,75,568,50,568,0,0
180 BORDER 11
190 SK%=500
200 ENV 1,10,-1,2
210 FOR i%=0 TO 15:INK i%,i%:NEXT
220 SYMBOL AFTER 229
230 '
240 'define graves
250 '
260 SYMBOL 230,0,0,24,60,110,94,255,25
5
270 '
280 'define priest
290
300 SYMBOL 232,60,60,255,60,60,24,255,
255
310 SYMBOL 233,255,189,189,189,189,126
,126,126
320 SYMBOL 234,126,126,126,126,228,4,4
,7
330 SYMBOL 235,126,126,126,39,32,32,22
4
340 '
350 'define vampire
360
370 SYMBOL 236,112,249,61,63,15,15,3,3
380 SYMBOL 237,14,143,188,252,240,240,
192,192
390 SYMBOL 238,1,1,7,31,63,57,48,32
400 SYMBOL 239,128,128,224,240,252,156
,12,4
410 '
420 'DEFINE WINDOWS
430 '
440 SYMBOL 240,0,0,24,52,82,82,145,145
450 SYMBOL 241,255,145,145,145,145,145
,145,255
460 '
470 'DEFINE GRASS
480 '
490 SYMBOL 242,32,34,148,72,42,26,40,1
6
500 '
510 GOSUB 2460'instructions
520 GOTO 810
530 '
540 'FILL ROUTINE
550 '
560 xo%=x%:yo%=y%
570 xo%=x%:yo%=y%
580 WHILE TEST(x%,y%)<>c%:PLOT x%,y%,c
%:x%=x%+4:WEND
590 x%=xo%-4
600 WHILE TEST(x%,y%)<>c%:PLOT x%,y%:
x%=x%-4:WEND
610 x%=xo%
620 IF TEST(x%,y%+2)<>c% THEN y%=y%+2:
GOTO 580
630 RETURN
640 '
650 IF TEST (xv%+32,yv%-16)<>6 THEN RE
TURN
660 SOUND 4,200,3,7:TAGOFF:PRINT CHR$(
23)+CHR$(0);:TAG
670 PLOT -10,0,10:MOVE (xv%+16),(yv%+8
):PRINT CHR$(230);:MOVE (xv%+16),(yv%-
8):PRINT CHR$(143);
680 TAGOFF:PRINT CHR$(23)+CHR$(1);:TAG
690 PLOT -10,0,9
700 wc%=wc%-1:IF wc%=0 THEN vopw%=1
710 RETURN
720 '
730 IF TEST (xp%+16,yp%-32)<>10 THEN R
ETURN
740 SOUND 4,100,3,7:TAGOFF:PRINT CHR$(
23)+CHR$(0);:TAG
750 PLOT -10,0,6:MOVE xp%,(yp%-16):PRI
NT CHR$(230);:MOVE xp%,(yp%-32):PRINT
CHR$(143);
760 TAGOFF:PRINT CHR$(23)+CHR$(1);:TAG
770 PLOT -10,0,8
780 wc%=wc%+1:IF wc%=24 THEN vopw%=1
790 RETURN
800 '
810 BORDER 11:INK 0,13
820 FOR i%=1 TO 15:INK i%,i%:NEXT
830 PRINT CHR$(23)+CHR$(0)
840 a$=CHR$(230)+" "+CHR$(230)+" "+CHR
$(230)+" "+CHR$(230)
850 b$=CHR$(143)+" "+CHR$(143)+" "+CHR
$(143)+" "+CHR$(143)
860 '
870 'set skyline
880 '
890 INK 13,26
900 PEN 2:LOCATE 1,1:PRINT STRING$(80,
143)
910 PEN 14:LOCATE 1,5:PRINT STRING$(80
,143)
920 PEN 13:LOCATE 1,9:PRINT STRING$(60
,143)
930 FOR I%=1 TO 20:LOCATE I%,11:PAPER
13:PEN 12:PRINT CHR$(242):NEXT
940 FOR i%=1 TO 3
950 PEN 0:LOCATE 3,8+i%:PRINT STRING$(
4,143):LOCATE 14,8+i%:PRINT STRING$(3,
143)
960 NEXT
970 MOVE 0,225:DRAWR 640,0,0
980 '
990 'draw castle
1000 '
1010 RESTORE 1040
1020 MOVE 66,226
1030 FOR dr%=1 TO 45:READ x%,y%:DRAWR
x%,y%,3:NEXT
1040 DATA 0,55,-10,10,-10,0,0,24,-4,16
,-10,0,0,34,14,4
1050 DATA 0,-14,14,0,2,12,16,0,0,-6,12
,-2,6,6,0,14
1060 DATA 18,0,0,-30,-10,-10,16,-4,0,-
16,40,0,0,12
1070 DATA 10,10,0,10,-10,10,0,20,12,8,
0,-14,9,0
1080 DATA 9,18,10,0,0,-18,14,0,0,16,14
,0,-4,-60,-16,0
1090 DATA -14,-20,0,-85,-19,0,0,47,-96
,0,0,-47,-14,0
1100 '
1110 'draw church
1120 '
1130 RESTORE 1160
1140 MOVE 400,226
1150 FOR dr%=1 TO 11:READ x%,y%:DRAWR
x%,y%,15:NEXT
1160 DATA 0,90,35,80,35,-90,100,0,20,-
20,0,-60,-75,0,0,47,-100,0,0,-47,-10,0
1170 '
1180 'fill castle
1190 '
1200 c%=3
1210 FOR i%=1 TO 7:READ x%,y%:GOSUB 56
0:NEXT
1220 DATA 71,229,101,359,40,355,193,31
8,220,375,169,375,180,229
1230 '
1240 'fill church
1250 '
1260 c%=15
1270 FOR i%=1 TO 3:READ x%,y%:GOSUB 56
0:NEXT
1280 DATA 411,229,432,334,516,229
1290 RESTORE 160
1300 LOCATE 3,4:PEN 0:PAPER 3:PRINT CH
R$(240)CHR$(8)CHR$(10)CHR$(241)
1310 LOCATE 18,8:PAPER 15:PRINT CHR$(2
40)CHR$(8)CHR$(10)CHR$(241)
1320 PAPER 0
1330 '
1340 'set up graves
1350 '
```

(continued on page 103)

(continued from page 101)

```
1360 INK 10,20:INK 6,24
1370 FOR y%=14 TO 22 STEP 4
1380 LOCATE 2,y%:PEN 10:PRINT a$
1390 LOCATE 2,y%+1:PEN 10:PRINT b$
1400 NEXT
1410 FOR y%=14 TO 22 STEP 4
1420 LOCATE 13,y%:PEN 6:PRINT a$
1430 LOCATE 13,y%+1:PEN 6:PRINT b$
1440 NEXT
1450 '
1460 'set up variables
1470 '
1480 xp%=416:yp%=270 'co-ord of priest
1490 xv%=80:yv%=246  'co-ord of vampir
e
1500 wc%=12
1510 tod=1:vopw%=0
1520 '
1530 'start of main game
1540 '
1550 PRINT CHR$(23)+CHR$(1);
1560 TAG
1570 PLOT -10,0,8
1580 MOVE xp%,yp%:PRINT CHR$(232);:MOV
E xp%,(yp%-16):PRINT CHR$(233);:MOVE x
p%,(yp%-32):PRINT CHR$(234);
1590 PLOT -10,0,9
1600 MOVE xv%,yv%:PRINT CHR$(236)+CHR$
(237);
1610 TAG
1620 '
1630 'main game loop
1640 '
1650 time1=TIME+SK%+INT(RND*1000)
1660 WHILE time1>TIME AND vopw%=0
1670 IF (XP%-XV%)=16 AND (YP%-YV%)=24
 THEN vopw%=1
1680 PLOT -10,0,8:MOVE xp%,yp%:PRINT C
HR$(232);:MOVE xp%,(yp%-16):PRINT CHR$
(233);:MOVE xp%,(yp%-32):PRINT CHR$(23
4);
1690 IF xp%<320 AND yp%>200 THEN 1710
1700 IF INKEY(PU%)=0 AND TEST(xp%+16,y
p%+30)=0 THEN yp%=yp%+32
1710 IF INKEY(PD%)=0 AND yp%>48 THEN
yp%=yp%-32
1720 IF INKEY(PL%)=0 AND TEST(xp%-4,yp
%)<>15 AND xp%>32 THEN  xp%=xp%-32
1730 IF INKEY(PR%)=0 AND TEST(xp%+32,y
p%)<>15 AND xp%<560 THEN  xp%=xp%+32
1740 MOVE xp%,yp%:PRINT CHR$(232);:MOV
E xp%,(yp%-16):PRINT CHR$(233);:MOVE x
p%,(yp%-32):PRINT CHR$(235);
1750 '
1760 PLOT -10,0,9
1770 MOVE xv%,yv%:PRINT CHR$(236)CHR$(
237);
1780 IF xv%>320 AND yv%>200 THEN 1800
1790 IF INKEY(VU%)=0 AND TEST(xv%+28,y
v%+30)=0 THEN yv%=yv%+32
1800 IF INKEY(VD%)=0 AND yv%>32 THEN y
v%=yv%-32
1810 IF INKEY(VL%)=0 AND TEST(xv%-4,yv
%)<>3 AND xv%>=32 THEN xv%=xv%-32
1820 IF INKEY(VR%)=0 AND TEST(xv%+64,y
v%)<>3 AND xv%<=530 THEN xv%=xv%+32
1830 MOVE xv%,yv%:PRINT CHR$(238)CHR$(
239);
1840 ON SQ(1) GOSUB 140
1850 PLOT -10,0,8:MOVE xp%,yp%:PRINT C
HR$(232);:MOVE xp%,(yp%-16):PRINT CHR$
(233);:MOVE xp%,(yp%-32):PRINT CHR$(23
5);
1860 IF INKEY(PF%)=0 AND tod=1 THEN GO
SUB 730
1870 MOVE xp%,yp%:PRINT CHR$(232);:MOV
E xp%,(yp%-16):PRINT CHR$(233);:MOVE x
p%,(yp%-32):PRINT CHR$(234);
1880 PLOT -10,0,9
1890 MOVE xv%,yv%:PRINT CHR$(238)CHR$(
239);
1900 IF INKEY(VF%)=0 AND tod=2 THEN GO
SUB 650
1910 MOVE xv%,yv%:PRINT CHR$(236)CHR$(
237);
1920 WEND
1930 IF vopw%=1 THEN GOTO 1970
1940 SOUND 2,150,3,7,0,0,10
1950 IF tod=1 THEN INK 2,9:INK 14,21:I
NK 13,19:BORDER 18:INK 0,0:tod=2:GOTO
1610
1960 INK 2,2:INK 14,14:INK 13,26:BORDE
R 11:tod=1:INK 0,13:GOTO 1610
1970 IF tod=2 THEN GOTO 2010 ELSE GOTO
 2180
1980 '
1990 'vamp win
2000 '
2010 TAGOFF
2020 PRINT CHR$(23)+CHR$(0);
2030 TAG
2040 PLOT -10,0,0
2050 MOVE xp%,yp%:PRINT CHR$(143);:MOV
E xp%,yp%-16:PRINT CHR$(143);:MOVE xp%
,yp%-32:PRINT CHR$(143);
2060 TAGOFF
2070 PRINT CHR$(23)+CHR$(1);
2080 PEN 15
2090 FOR r%=12 TO 24
2100 INK 0,RND*26
2110 LOCATE 6,r%:PRINT"Evil wins"
2120 SOUND 1,r%*10,1,7
2130 NEXT:INK 0,0:RESTORE 2310
2140 GOTO 2300
2150 '
2160 'priest win
2170 '
2180 TAGOFF
2190 PRINT CHR$(23)+CHR$(0)
2200 TAG
2210 PLOT -10,10,0
2220 MOVE xv%,yv%:PRINT CHR$(143);:MOV
E xv%+32,yv%:PRINT CHR$(143);
2230 TAGOFF
2240 PRINT CHR$(23)+CHR$(1);
2250 FOR r%=12 TO 24
2260 INK 0,RND*26
2270 LOCATE 6,r%:PEN 8:PRINT"Good wins
"
2280 SOUND 1,r%*10,1,7
2290 NEXT:INK 0,0:RESTORE 2310
2300 FOR d%=1 TO 26:READ n%:SOUND 1,n%
*4,20,7:SOUND 2,n%,20,7:NEXT
2310 DATA 60,53,47,45,60,0,45,47,45,40
,53,0,53,0,53,47,45,36,40,40,45,45,47,
53,47,60
2320 FOR i%=0 TO 13:LOCATE 1,1:PRINT C
HR$(11):NEXT
2330 GOTO 2350
2340 '
2350 'another go
2360 '
2370 INK 1,1+RND*26
2380 LOCATE 3,7:PRINT "Another go Y/N?
"
2390 IF INKEY(43)=0 THEN no%=0:RESTORE
 160:GOTO 2420
2400 IF INKEY(46)=0 THEN RUN
2410 GOTO 2370
2420 FOR i%=0 TO 13:LOCATE 1,26:PRINT
CHR$(8):NEXT
2430 GOTO 1330
2440 NEXT
2450 '
2460 'instructions
2470 '
2480 INK 0,26:INK 13,3,8
2490 LOCATE 5,1:PEN 12:PRINT"****Instr
uctions****"
2500 LOCATE 3,10:PEN 13:PRINT"press sp
ace to cont."
2510 LOCATE 3,18:PEN 9:PRINT"press S t
o start."
2520 IF INKEY(60)=0 THEN CLS:RETURN
2530 IF INKEY$=" " THEN GOTO 2540 ELSE
 GOTO 2520
2540 GOSUB 3060
2550 LOCATE 1,8:PEN 3:PRINT"******Vamp
ire-******"
2560 LOCATE 9,10:PRINT CHR$(238);CHR$(
239)
2570 LOCATE 2,13:PEN 9:PRINT "up down
left right"
2580 LOCATE 5,15:PEN 11:PRINT "joy sti
ck 1"
2590 IF INKEY$<>" "THEN 2590
2600 GOSUB 3060
2610 LOCATE 1,8:PEN 6:PRINT"******Prie
st-*******"
2620 LOCATE 10,10:PEN 4:PRINT CHR$(232
);CHR$(10);CHR$(8);CHR$(233);CHR$(10);
CHR$(8);CHR$(234)
2630 LOCATE 2,14:PEN 9:PRINT "up down
left right"
2640 LOCATE 5,16:PEN 11:PRINT "joy sti
ck 0"
2650 IF INKEY$<>" "THEN 2650
2660 GOSUB 3060
2670 IF INKEY$<>" "THEN 2670
2680 MODE 1:INK 1,0:INK 2,7,8
2690 PRINT"THE PRIEST MUST CHANGE ALL
THE CYAN"
2700 PRINT"GRAVES TO YELLOW AND THE VA
MPIRE SHOULD"
2710 PRINT"DO THE OPPOSITE."
2720 PRINT
2730 PRINT"THE PRIEST MAY ONLY CHANGE
GRAVES"
2740 PRINT"DURING THE DAY AND THE VAMP
IRE"
2750 PRINT"MAY ONLY CHANGE GRAVES DURI
NG"
2760 PRINT"THE NIGHT."
2770 PRINT
2780 PRINT"NIGHT IS INDICATED BY A  SH
ADED GREEN"
2790 PRINT"SKY WHEREAS DAY IS INDICATE
D BY A"
2800 PRINT"SHADED BLUE SKY."
2810 PRINT
2820 PRINT"GRAVES ARE CHANGED BY POSIT
IONING YOUR"
2830 PRINT"PLAYER OVER THE TOP AND PRE
SSING 'FIRE'"
2840 PRINT"ON THE JOYSTICK."
2850 PRINT
2860 PEN 2:PRINT"       PRESS SPACE TO
CONTINUE."
2870 IF INKEY$<>" " THEN GOTO 2870
2880 CLS
2890 PEN 2:LOCATE 15,2:PRINT"WARNING."
2900 PRINT
2910 PEN 3:PRINT"DURING HIS OWN PLAYIN
G PERIOD A"
2920 PRINT"PLAYER MAY CAPTURE HIS OPPO
NENT FOR"
2930 PRINT"AN IMMEDIATE VICTORY."
2940 PRINT
2950 PRINT"***************************
**************"
2960 PRINT
2970 PRINT:PRINT:PRINT"    INPUT SKILL
 LEVEL (1 TO 20)"
2980 PRINT"       1-HARD    20-EASY ";
2990 INPUT SK%
3000 IF SK%<1 OR SK%>20 THEN SOUND 1,5
0,10,7:GOTO 2990
3010 SK%=(SK%*100)
3020 PRINT:PEN 2:PRINT"       PRESS SPA
CE BAR TO PLAY."
3030 IF INKEY$<>" " THEN 3030
3040 MODE 0
3050 RETURN
3060 FOR i%=1 TO 23:LOCATE 1,1:PRINT C
HR$(8):NEXT
3070 FOR i%=1 TO 23:LOCATE 1,26:PRINT
CHR$(11):NEXT
3080 BORDER 0:SOUND 1,100,10,7
3090 FOR D%=1 TO 100:NEXT
3100 BORDER 26:SOUND 1,200,10,7
3110 FOR D%=1 TO 100:NEXT
3120 LOCATE 3,19:PEN 13:PRINT"press sp
ace to cont."
3130 RETURN
```

Busy bee

Tony Wye,
Hayes,
Middlesex.

Spectrum

THIS PROGRAM is called Busy Bee and runs on the Spectrum 16 and 48K. It's a maze type game where you have to cut the grass on a lawn avoiding the bees who are attracted to you because of the lawn mower noise.

Upon loading, the game auto runs and the instructions are displayed and the keys to be used — cursor keys — then P must be pressed to play. The screen is set up and you must move around the flower beds and cut the grass avoiding the bees who are moving about. When all the grass is cut you leave the screen via the bottom and then your bonus is added according to the time you took to clear the grass. Then you go on to the differently shaped screen 2.

This carries on with the screens 1 and 2 in turn and each stage the bees are attracted more and more to you until it is nearly impossible to get away from them. By then all your lives will have been used up. When all three lives are used the game over sign will be displayed and tell you if it is a new high score.

The hex loader.

```
  10 DEF FN h(h$)=16*(CODE h$(1)
-48-(7 AND h$(1)>"9"))+CODE h$(2
)-48-(7 AND h$(2)>"9")
  20 INPUT "Start ";s
  30 INPUT "Finish ";f
  40 FOR n=s TO f STEP 8
  50 LET tot=0: PRINT n;": ";
  60 INPUT h$: PRINT h$;
  70 LET x=0
  80 FOR b=1 TO LEN h$ STEP 2
  90 LET z=FN h(h$): LET tot=tot
+z
 100 POKE n+x,z
 110 LET h$=h$(3 TO ): LET x=x+1
 120 NEXT b
 130 PRINT " = ";: INPUT t: PRIN
T t
 140 IF tot<>t THEN PRINT "input
 error - try again": GO TO 50
 150 NEXT n
 160 REM enter STOP to stop
```

(continued from previous page)

Program 1.

```
  10 PAPER 0:BORDER 0:INK 6:
CLS
  20 PRINT AT 10,7; FLASH 1;
"BUSY BEE IS LOADING"
  30 LOAD ""CODE
  40 PRINT USR 31495
9997 REM SAVE ROUTINE
9998 SAVE "BUSY BEE" LINE 10
9999 SAVE "BUSY CODE"CODE 29
625,4525
```

The hex dump.

```
29625: 0018242424241800 = 192
29633: 0010301010103800 = 168
29641: 001824040B103C00 = 148
29649: 0038043804043800 = 180
29657: 0020202020283C0800 = 204
29665: 003C203804043800 = 212
29673: 0018203824241800 = 208
29681: 003C040808101000 = 112
29689: 0018241824241800 = 180
29697: 0018241C04040800 = 132
29705: 1F644A8490A89081 = 922
29713: F80622512500B501 = 551
29721: 8109150921522 6F8 = 569
29729: 81A0D0A48A44601F = 994
29737: FF20522502102810 = 480
29745: 40A44A04205020FF = 705
29753: 90A892058290A890 = 1177
29761: 41A54B0521512101 = 458
29769: 00140840A44A0400 = 342
29777: 3C7EFFE7E7FF7E3C = 1344
29785: 0000002000000000 = 146
29793: 00000101017F4141 = 260
29801: 0000FE0101F13D3D = 619
29809: 41417F0101010000 = 260
29817: 3D3DF10101FE0000 = 619
29825: 00007F80808FBCBC = 902
29833: 00000000000FE8282 = 898
29841: BCBC8F80807F0000 = 902
29849: 8282FE8080000000 = 898
29857: 000704040404043F = 90
29865: 00E02020202020FC = 636
29873: 242427272323201F = 283
29881: 2424E4E4C4C404F8 = 1172
29889: 1F20232327272424 = 283
29897: F804C4C4E4E42424 = 1172
29905: 3F04040404040700 = 90
29913: FC2020202020E000 = 636
29921: 1C1C083E49081414 = 247
29929: 040A110206041 53A = 122
29937: 2050080406020A85C = 700
29945: 393F1C0F08070201 = 181
29953: 9CFC38F010E04000 = 1008
29961: 000021005801E002 = 348
29969: 113F751AFE442805 = 590
29977: 3E327718033E2077 = 471
29985: 23130B78FE0020EB = 706
29993: 79FE0020E6C90001 = 839
30001: E402112078CD3C20 = 696
30009: 1800061600004242 = 392
30017: 4242424242424242 = 528
30025: 4242424242424242 = 528
30033: 4242424242424242 = 528
30041: 424242424242423F = 525
30049: 3F3F3F3F3F3F3F3F = 504
30057: 3F3F3F3F3F3F3F3F = 504
30065: 3F3F3F3F3F3F3F3F = 504
30073: 3F3F3F3F3F424144 = 514
30081: 4444444444444444 = 544
30089: 4444444444444444 = 544
30097: 4444444444444444 = 544
30105: 4444444444404144 = 537
30113: 4444444444444444 = 544
30121: 4444444444444444 = 544
30129: 4444444444444444 = 544
30137: 4444444444404144 = 537
30145: 443A3E3E3E3E3B44 = 501
30153: 443A3B44443A3B44 = 506
30161: 443A3B44443A3E3E = 503
30169: 3E3E3B4444404144 = 516
30177: 4440423F3F3F3C44 = 515
30185: 443D3C44443D3C44 = 514
30193: 443D3C44443D3F3F = 512
30201: 3F42414444404144 = 527
30209: 4440414444444444 = 537
30217: 4444444444444444 = 544
30225: 4444444444444444 = 544
30233: 4440414444404144 = 530
30241: 443D3C4444444444 = 529
30249: 4444444444444444 = 544
30257: 4444444444444444 = 544
30265: 443D3C4444404144 = 522
30273: 44444444443A3B44 = 525
30281: 443A3E3E3B44443A = 503
30289: 3E3E3B44443A3B44 = 504
30297: 4444444444404144 = 537
30305: 4444444444404144 = 537
30313: 443D3F3F3C44443D = 512
30321: 3F3F3C4444404144 = 519
30329: 4444444444404144 = 537
30337: 443A3B4444404144 = 518
30345: 4444444444444444 = 544
30353: 4444444444404144 = 537
30361: 443A3B4444404144 = 518
30369: 4440414444404144 = 530
30377: 4444444444444444 = 544
30385: 4444444444404144 = 537
30393: 4440414444404144 = 530
30401: 44404144443D3C44 = 522
30409: 443A3E3E3B44443A = 503
30417: 3E3E3B44443D3C44 = 508
30425: 4440414444404144 = 530
30433: 443D3C4444444444 = 529
30441: 4440424241444440 = 529
30449: 4242414444444444 = 537
30457: 443D3C4444404144 = 522
30465: 4444444444444444 = 544
30473: 4440424241444440 = 529
30481: 4242414444444444 = 537
30489: 4444444444404144 = 537
30497: 44444444443A3B44 = 525
30505: 443D3F3F3C44443D = 512
30513: 3F3F3C44443A3B44 = 507
30521: 4444444444404144 = 537
30529: 443A3B4444404144 = 518
30537: 4444444444444444 = 544
30545: 4444444444404144 = 537
30553: 443A3B4444404144 = 518
30561: 4440414444404144 = 530
30569: 4444444444444444 = 544
30577: 4444444444404144 = 537
30585: 4440414444404144 = 530
30593: 444041444440423E = 525
30601: 3E3E3E3E3B44443A = 501
30609: 3E3E3E3E3E424144 = 509
30617: 4440414444404144 = 530
30625: 443D3C44443D3F3F = 512
30633: 3F3F3F3F3C44443D = 509
30641: 3F3F3F3F3F3F3C44 = 506
30649: 443D3C4444404144 = 522
30657: 4444444444444444 = 544
30665: 4444444444444444 = 544
30673: 4444444444444444 = 544
30681: 4444444444404144 = 537
30689: 4444444444444444 = 544
30697: 4444444444444444 = 544
30705: 4444444444444444 = 544
30713: 444444444440423E = 532
30721: 3E3E3E3E3E3E3E3E = 496
30729: 3E3E3E3E3B44443A = 501
30737: 3E3E3E3E3E3E3E3E = 496
30745: 3E3E3E3E3E420006 = 382
30753: 1600004242424242 = 352
30761: 4242424242424242 = 528
30769: 4242424242424242 = 528
30777: 4242424242424242 = 528
30785: 424242423F3F3F3F = 516
30793: 3F3F3F3F3F3F3F3F = 504
30801: 3F3F3F3F3F3F3F3F = 504
30809: 3F3F3F3F3F3F3F3F = 504
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30889: 44443A3B44443A3E = 509
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30905: 44443A3B44443A3B = 506
30913: 4444404144443D3C = 522
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30977: 4444404144444444 = 537
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31241: 4444444444443D3C = 529
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31481: 3E3E3E3E3E3E3E3E = 496
31489: 3E3E420000002100 = 223
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31513: 010003162672230B = 224
31521: 7B8120F93E20324B = 794
31529: 5C11487B01A001CD = 671
31537: 3C20ED4B6985CD1B = 874
31545: 1A3ADF00DBFE1F38 = 867
31553: FBC3E87CC3E87C16 = 1372
31561: 0001001110612 00 = 69
31569: 4275737920426565 = 719
31577: 1602000204D6F7665 = 463
31585: 20796F7572206C61 = 732
31593: 776E206D6F776572 = 815
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31609: 746F202063757420 = 655
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31633: 20717569636B6C79 = 802
31641: 206173207 06F7373 = 729
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31657: 676574206120626F = 690
31665: 6E75732E20202020 = 516
31673: 20202020576B656E = 530
31681: 20616C6C20746865 = 698
31689: 2067726173732069 = 713
31697: 7320637574206C65 = 720
31705: 6176652074686520 = 701
31713: 73637265656E2076 = 790
31721: 6961207468652062 = 685
31729: 6F74746F6D206578 = 816
31737: 69742E1600002042 = 395
31745: 75742074776F2062 = 741
31753: 6565732068617665 = 769
31761: 206D697374616B65 = 782
31769: 6E20202020202079 = 423
31777: 6F7520666F722061 = 716
31785: 20717565656E2062 = 704
31793: 656361757365206F = 773
31801: 6620746865202065 = 620
31809: 6E67696E65206E6F = 782
31817: 6973652C616E7920 = 725
31825: 636F6E7461637420 = 780
31833: 7769746820202074 = 656
31841: 686520626565206D = 678
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31857: 2061726520737475 = 724
31865: 6E672E596F752063 = 707
31873: 616E206F6E6C7920 = 721
31881: 776974687374616E = 882
31889: 6420746872656520 = 700
31897: 7374696E6773160E = 780
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31913: 736F72206D657973 = 816
31921: 2020352C362C372C = 366
31929: 3829161106406967 = 422
31937: 6020536 36F726520 = 676
31945: 3A20202020202016 = 272
31953: 1406505245535320 = 455
31961: 27502720544F2050 = 465
31969: 4C41592E1611133E = 396
31977: 3932365C3E723237 = 534
31985: 5C3E03326F853E00 = 513
31993: 326B85326C853E20 = 675
32001: 320F5C3E14324D7E = 620
32009: 3E0132BE8221EE02 = 658
32017: 224A7E3E31326885 = 632
32025: 181C5D5E52A317D = 903
32033: 545D292919292929 = 407
32041: 1922317DE1D1C1C9 = 1061
32049: 400906020E0F3E00 = 180
32057: 326D85326E85ED43 = 889
32065: 66B516011E16ED53 = 628
32073: 5382161D1E14ED53 = 634
32081: 5182ED5322851CED = 963
32089: 5329853E01324F82 = 579
32097: 3C3250823E20328D = 605
32105: 5C3E01326B5C3A6B = 566
32113: 85CB4720143E2032 = 603
32121: 34753E243212753E = 514
32129: 7832357532137518 = 550
32137: 123E3B323475 3E3F = 403
32145: 3212753E75323575 = 584
32153: 321375CD30753E02 = 620
32161: 32685C180F0632C5 = 541
32169: C5060010FEC110F8 = 930
32177: C110F4C93E003236 = 820
32185: 5C3E3C32375C0118 = 436
32193: 0011027ECD3C203E = 504
32201: 16D73E00D73E1CD7 = 819
32209: 3E4CD73A6885D73E = 925
32217: 3932365C3E723237 = 534
32225: 5C111A7E0103003A = 323
32233: 6F853D03FE0020FA = 844
32241: CD3C200129001121 = 389
32249: 7ECD3C20CDA67D18 = 943
32257: 4A160000536 33A16 = 358
32265: 00124C697665733A = 591
32273: 160000426F6E7573 = 549
32281: 3A16001855555555 = 444
32289: 16141D1501565716 = 288
32297: 1401150156571615 = 259
32305: 0150591501161 51D = 272
32313: 5859150016020F4D = 314
32321: 4E16030F4F501600 = 299
32329: 1FE8033EEFDBFE1F = 1071
32337: D2DB7E3A4F82FE02 = 1078
32345: CA558206 14C506FF = 901
32353: 10FEC110F83A7085 = 1030
32361: FE0020553E16D73E = 732
32369: 00D73E0FD73E20D7 = 816
32377: 3E20D73E16D73E00 = 670
32385: D73E0ED72A4A7E7C = 872
32393: FE0020057DFE0028 = 710
32401: 1220224A7EE5C1CD = 922
32409: 1B1A3E16D73E00D7 = 629
32417: 3E1ED73EEFDBFE1F = 1112
32425: 1F1FD2AE7F1FD2AF = 989
32433: 811FD20E803EF7DB = 1168
32441: FEE610CA2080C37C = 1181
32449: 7F3E00327085CD3C = 749
32457: 853A6F85CDA67D3D = 992
32465: FE0028063 26F85C3 = 789
32473: 337D0110001 12D7F = 382
32481: 3E0032365C3E3C32 = 430
32489: 375CCD3C202A6885 = 726
32497: ED4B69857C8B302A = 956
32505: 20047DB9302 42A6B = 587
32513: 852269851 1107F01 = 566
32521: 1300CD3C20181316 = 381
32529: 0C0912014E657720 = 370
32537: 486967682053636F = 709
32545: 7265CDA67DCDA67D = 1207
32553: C3077BC916001820 = 604
32561: 160A0B47616D6520 = 453
32569: 4F7665723E16D73E = 773
32577: 00D73E03D72A6B85 = 777
32585: ED4B6D853A7285FE = 1113
32593: 0028022303 3A7385 = 386
32601: FE002802230 33E00 = 396
32609: 327285327385226B = 736
32617: 85ED436D85E5C1CD = 1306
32625: 1B1A3E16D73E00D7 = 629
32633: 3E1ED73A7085FE00 = 864
32641: C2C27ECD32853A71 = 1073
32649: 85FE00CA55822154 = 921
32657: 01110100E5D5CDB5 = 847
32665: 03D1E1011400ED42 = 761
32673: 7CFE0020EF3E0032 = 761
32681: 7185C35582ED4B66 = 1070
32689: 850C0CCD2782FE28 = 825
32697: D27C7F04CD2782FE = 1093
32705: 2830B8CD3982FE0A = 928
32713: DACF7F327085FE02 = 1103
32721: 20053E0132728505 = 402
32729: CD3982FE0A380332 = 765
32737: 7085FE0220053E01 = 601
32745: 3273850D0D783215 = 515
32753: 803C321B80793216 = 586
32761: 80321C800CED4366 = 752
32769: 851113800 10D00CD = 516
32777: 3C203E01327185C3 = 646
32785: 3D7F06160A0A2045 = 337
32793: 46160B0A204748ED = 525
32801: 4B66850DCD2782FE = 951
32809: 28D27C7F04CD2782 = 879
32817: FE28D27C7FCD3982 = 1147
32825: FE0A380332708 5FE = 872
32833: 0220053E01327285 = 399
32841: 05CD3982FE0A3803 = 720
32849: 327085FE0220053E = 650
32857: 01327385783 28380 = 728
32865: 3C32898079328480 = 806
32873: 328A80ED43668511 = 872
32881: 818001BD00CD3C20 = 568
32889: 3E01327185C33D7F = 742
32897: 06160A0A494A2016 = 249
32905: 0B0C4B4C20ED4B66 = 620
32913: B504047BFE16C239 = 788
32921: 6179FE0FC239812A = 941
32929: 6D857DFE98C27C7F = 1218
32937: 7CFE01C27C7FCD57 = 1116
32945: 85CD57852A4A7E7C = 924
32953: FE0020057DFE0026 = 710
32961: 4A28224A7E3E16D7 = 650
32969: 3E00D73E0FD73E20 = 663
32977: D73E20D73E16D73E = 885
32985: 00D73E0ED7E5C1CD = 1133
32993: 1B1A2A6B8523226B = 511
```

```
33001: 853E16D73E00D73E = 771
33009: 03D7E5C1CD1B1A11 = 915
33017: 010021B004CDB503 = 603
33025: 11010021E803CDB5 = 672
33033: 0310A93A8E82C620 = 756
33041: 3816328E82CDA67D = 896
33049: 3A68853C32688521 = 675
33057: EE02224A7EC3337D = 845
33065: 3A4D7ED605324D7E = 733
33073: 3E32328E82C3337D = 805
33081: CD2782FE28D27C7F = 1129
33089: 0CCD2782FE28D27C = 1014
33097: 7FCD3982FE0A3803 = 842
33105: 327085FE0220053E = 650
33113: 013272850DCD3982 = 703
33121: FE0A3803327085FE = 872
33129: 0220053E01327385 = 400
33137: 05057932A28132A7 = 689
33145: 8132AC81780432A1 = 815
33153: 813C32A6813C32AB = 815
33161: 81ED436685119F81 = 973
33169: 011000CD3C203E01 = 377
33177: 327185C33D7F0616 = 707
33185: 0A0A2020160A0A4D = 203
33193: 4E160A0A4F50ED4B = 591
33201: 668505CD2782FE28 = 908
33209: D27C7F0CCD2782FE = 1101
33217: 28D27C7FCD3982FE = 1147
33225: 0A3803327085FE02 = 620
33233: 20053E013272850D = 410
33241: CD3982FE0A380332 = 765
33249: 7085FE0220053E01 = 601
33257: 32738579321A8232 = 675
33265: 1F82322482783219 = 572
33273: 823C321E823C3223 = 545
33281: 82ED436685111782 = 839
33289: 011000CD3C203E01 = 377
33297: 327185C33D7F0616 = 707
33305: 0A0A5152160A0A53 = 308
33313: 54160A0A20202600 = 228
33321: 6816005929292929 = 379
33329: 2919110050197EC9 = 523
33337: 78E618C640677887 = 994
33345: 87878787816F1100 = 797
33353: 02197EC900000000 = 354
33361: 000000002A5182ED = 490
33369: 4B5382ED43518222 = 837
33377: 53823A4F82473A50 = 689
33385: 82324F8278325082 = 769
33393: 3A4D82473A4E8232 = 652
33401: 4D8278324E823A51 = 724
33409: 82473A52824FCD1B = 782
33417: 7D3A327DFEC83027 = 899
33425: 3E09324D82CD1B7D = 685
33433: 3A327DFE80380C3A = 741
33441: 6785882006D25983 = 896
33449: C370843A66858928 = 957
33457: EEDACF82C3E883CD = 1556
33465: 187D3A327DFE4038 = 759
33473: 0DFE80DA5983FEC0 = 1279
33481: DAE883C370842A51 = 1143
33489: 820DCD2782FE28D2 = 1021
33497: 4C7E04CD2782FE28 = 874
33505: D24C7ECD3982FE02 = 1060
33513: 2823FE1C281FFE11 = 699
33521: 281BFE382817FE88 = 830
33529: 2813FE13280FFE8A = 779
33537: 280BFE1E2807FE3A = 694
33545: 280332708505CD39 = 605
33553: 82FE022823FE1C28 = 783
33561: 1FFE38281BFE1128 = 719
33569: 17FE882813FE1328 = 785
33577: 0FFE8A280BFE1E28 = 782
33585: 07FE3A2803327085 = 657
33593: 3A4D82FE01CA4C7E = 924
33601: 3E03324D82CDF784 = 906
33609: 3A52823D32238532 = 599
33617: 2A85325282C31485 = 785
33625: 040478FE16CA4C7E = 808
33633: CD2782FE28D24C7E = 1080
33641: 0CCD2782FE28D24C = 966
33649: 7ECD3982FE022823 = 849
33657: FE1C281FFE38281B = 730
33665: FE112817FE882813 = 783
33673: FE13280FFE8A280B = 771
33681: FE1E2807FE3A2803 = 686
33689: 3270850DCD3982FE = 954
33697: 022823FE1C281FFE = 684
33705: 38281BFE112817FE = 711
33713: 882813FE13280FFE = 777
33721: 8A280BFE1E2807FE = 774
33729: 3A28033270853A4D = 531
33737: 82FE02CA4C7E3E04 = 856
33745: 324D82CDF7843A51 = 980
33753: 823C325182322285 = 668
33761: 3C322985C314850C = 644
33769: 0CCD2782FE28D24C = 966
33777: 7E04CD2782FE28D2 = 1088
33785: 4C7ECD3982FE0228 = 890
33793: 23FE1C281FFE3828 = 738
33801: 1BFE112817FE8828 = 791
33809: 13FE13280FFE8A28 = 779
33817: 0BFE1E2807FE3A28 = 694
33825: 0332708505CD3982 = 695
33833: FE022823FE1C281F = 684
33841: FE38281BFE112817 = 711
33849: FE882813FE13280F = 777
33857: FE8A280BFE1E2807 = 774
33865: FE3A28033270853A = 708
33873: 4D82FE03CA4C7E3E = 930
33881: 01324D82CDF7843A = 900
33889: 52823C3252823223 = 619
33897: 85322A85C3148505 = 711
33905: CD2782FE28D24C7E = 1080
33913: 0CCD2782FE28D24C = 966
33921: 7ECD3982FE022823 = 849
33929: FE1C281FFE38281B = 730
33937: FE112817FE882813 = 783
33945: FE13280FFE8A280B = 771
33953: FE1E2807FE3A2803 = 686
33961: 3270850DCD3982FE = 954
33969: 022823FE1C281FFE = 684
33977: 38281BFE112817FE = 711
33985: 882813FE13280FFE = 777
33993: 8A280BFE1E2807FE = 774
34001: 3A28033270853A4D = 531
34009: 82FE04CA4C7E3E02 = 856
34017: 324D82CDF7843A51 = 980
34025: 823D325182322285 = 669
34033: 3C322985181D3A51 = 476
34041: 823222853C322985 = 631
34049: 3A5282322385322A = 580
34057: 85112085010F00CD = 536
34065: 3C20C91120850112 = 494
34073: 00CD3C20C34C7E06 = 708
34081: 1612181501565716 = 281
34089: 1318585916001E15 = 293
34097: 0011010021E803CD = 491
34105: B503C90610C53A48 = 734
34113: 5C0F0F0F1E00F3D3 = 621
34121: FEEE104310FE1C20 = 905
34129: F6FBC110E8C90614 = 1165
34137: 6869C5110400CDB5 = 805
34145: 03C110F4C900 = 657
```

Mineral Rights

GN Woodhead,
Wyke,
Bradford.

CBM-64

THIS IS AN adventure-type game. You are the leader of a mining colony in outer space and have to make decisions concerning the welfare of the planet. Full instructions are included within the program.

```
5 GOTO1000
10 L=INT(RND(1)*3+5):REM NO. OF MINES
20 P=INT(RND(1)*60+40):REM NO. OF WORKERS
30 M=INT(RND(1)*50+10)*P:REM [illegible]UNT OF MONEY
40 FP=INT(RND(1)*40+80):REM PRICE OF FOOD
50 CE=INT(RND(1)*40+80):REM ORE PRODUCED/MINE
60 C=0:REM SETS ORE IN STORAGE TO ZERO
70 S=1:REM SETS SATISFACTION FACTOR TO ZERO
80 Y=1:REM SETS YEARS TO ZERO
90 LP=INT(RND(1)*2000+2000):REM BUYING/SELLING PRICE FOR MINES
100 CP=INT(RND(1)*12+7):REM SELLING PRICE FOR ORE.
110 REM CURRENT STATE AFFAIRS OF COLONY
120 PRINT"▮"
130 PRINT"YEAR";Y
140 PRINT
150 PRINT"THERE ARE";P;"WORKERS IN THE COLONY."
160 PRINT"YOU HAVE";L;"MINES,AND $";M
170 PRINT"SATISFACTION FACTOR IS ";S
180 PRINT
190 PRINT"YOUR MINES PRODUCED";CE;"TONS EACH."
200 C=C+CE*L
210 PRINT"AMOUNT OF ORE IN STORE IS";C;"TONS"
220 PRINT
230 PRINT"▮SELLING▮"
240 PRINT"————▮"
250 PRINT"ORE SELLING PRICE IS $";CP;"PER TON"
260 PRINT"MINE SELLING PRICE IS $";LP;"PER MINE"
270 REM ASKS HOW MUCH ORE TO SELL
280 PRINT"HOW MUCH ORE DO YOU WISH TO SELL?"
290 INPUTCS
300 IFCS<0ORCS>CTHEN290
310 REM TAKES AWAY SOLD ORE
320 C=C-CS
330 REM ADDS TO MONEY SUPPLY
340 M=M+CS*CP
345 CS=0
350 REM ASKS HOW MANY MINES TO SELL
360 PRINT"HOW MANY MINES DO YOU WISH TO SELL"
370 INPUTLS
380 IFLS<0ORLS>LTHEN370
390 REM TAKES AWAY MINE(S)
400 L=L-LS:IFL<1THEN940
405 LS=0
410 REM ADDS TO MONEY SUPPLY
420 M=M+LS*LP
430 PRINT"YOU NOW HAVE $";M
440 PRINT"▮BUYING▮"
450 PRINT"————▮"
460 REM ASKS HOW MUCH TO SPEND ON FOOD
470 PRINT"HOW MUCH TO SPEND ON FOOD(APPR.$100 EA.)"
480 INPUTFB
490 REM CHECKS IF THERE'S ENOUGH MONEY
500 IFFB<0ORFB>MTHEN480
510 REM ADJUSTS MONEY SUPPLY
520 M=M-FB
525 FB=0
530 REM ADJUSTS SATISFACTION FACTOR
540 IFFB/P>120THENS=S+.1
550 IFFB/P<80THENS=S-.1
560 REM ASKS HOW MANY MINES TO BUY
570 PRINT"HOW MANY MINES DO YOU WISH TO BUY?"
580 INPUTLB
590 IFLB<0ORLBLP>MTHEN580
600 REM INCREASE NO. OF MINES IF NEEDED
610 L=L+LB
620 REM ADJUST MONEY SUPPLY AGAIN
630 M=M-LB*LP
635 LB=0
640 REM CHECKS SATISFACTION FACTOR
650 IFS<.6THEN880
660 IFS>1.1THENCE=CE+INT(RND(1)*20+1)
670 IFS<.9THENCE=CE-INT(RND(1)*20+1)
680 REM CHECK IF 10 WORKERS/MINE
690 IFP/L<10THEN900
700 IFS>1.1THENP=P+INT(RND(1)*10+1)
710 IFS<.9THENP=P-INT(RND(1)*10+1)
720 REM IF THERE IS MORE THAN 30 WORKERS
730 IFP<30THEN700
740 IFRND(1)>.01THEN780
750 REM RADIOACTIVE LEAK..WORKERS HALVED
760 PRINT"RADIOACTIVE LEAK...........MANY DIE!"
770 P=INT(P/2)
780 IFCE<150THEN820
790 REM MARKET GLUT..PRICE HALVED
800 PRINT"MARKET GLUT..........PRICE DROPS!"
810 CE=INT(CE/2)
820 REM ADD 1 TO YAERS
830 FORR=1TO200:NEXTR
840 Y=Y+1
850 GOTO90
880 PRINT"THE WORKERS REVOLTED!"
890 GOTO2000
900 PRINT"YOU'VE OVERWORKED EVERYONE!"
910 GOTO2000
920 PRINT"YOU'VE NOT ENOUGH WORKERS LEFT!"
```

(continued on next page)

(continued from previous page)

```
930 GOTO2000
940 PRINT"NO MORE MINES....GAME
OVER."
950 GOTO2000
999 REM ROUTINE FOR TITLE
1000 PRINT""
1001 POKE53280,0:POKE53281,0:REM
 MAKE SCREEN BLACK
1002 J$=" MINERAL RIGHTS"
1003 FORN=1TO2
1010 FORH=0TO10
1015 FORHG=1TO100:NEXTHG:REM PAU
SE LOOP
1020 PRINTTAB(H);J$
1030 NEXTH
1035 PRINT""
1040 J$="                      "
1050 NEXTN
1070 PRINT"  YOU ARE THE NEWLY
 ELECTED LEADER OF A"
1080 PRINT" MINING COLONY ON TH
E PLANET ASTRON."
1090 PRINT" ALL DECISIONS CON
CERNING THE SALE"
1100 PRINT" OF ORE TO INTERGALA
CTIC TRADERS,FOOD"
1110 PRINT" PURCHASES AND BUYIN
G & SELLING OF"
1120 PRINT" MINES ARE MADE BY Y
OU!"
1125 PRINT" THERE MUST BE AT L
EAST 10 WORKERS/MINE"
1130 PRINT"PRESS
ANY KEY"
1140 PRINT"
"
1150 GETR$:IFR$=""THEN1150
1160 GOTO10
1999 REM 'GAME OVER' SEQUENCE
2000 PRINT"GAME OVER"
2010 PRINT" YOU LASTED";Y;"Y
EARS"
2020 PRINT"WOULD YOU LIKE TO
HAVE ANOTHER GAME?"
2030 PRINT"(Y/N)"
2040 GETR$
2050 IFR$="N"THENSTOP
2060 IFR$="Y"THENRUN10
2070 GOTO2040
READY.
```

BBC colours

R. Watson,
Athersley South,
Barnsley.

ON BBC MICROS with Basic II, the filling command Plot 77 is available and is also pretty well known. A lesser known relative of this command is Plot 76, which does not draw a line, but just makes the cursor movements, which may be read using OSword with A=&D.

When the command Plot 77,x,y is given, the graphics cursor travels left until the pixel at that position is a non-background pixel, i.e. a different colour to the origin. This co-ordinate is then noted, the cursor then scans right until a similar pixel is found, and a line is drawn between these two points.

When using Plot 76, similar cursor movements are made, but without any line been drawn between points. Therefore it is possible to use this command to create your own fill routine, as I have done.

A method of obtaining new colours on the BBC which has received a lot of publicity lately is pixel "Dithering". What that means is mixing two or more colours to form a pattern similar to a chess board, the idea being that from normal viewing distance a screenful of such a pattern, say with alternating red and yellow pixels, would look orange. This is what my program sets out to do.

The only things that may need explaining in the program are the OSword call, and the method of pixel dithering. The OSword call with A=&D is used to read the last two sets of graphic co-ordinates. First of all an area must be allocated somewhere for the routine to dump its data — I have used eight locations on the zero page. After the call, the information is laid out like this — as given in the Advanced User Guide.

```
XY + 0 previous x,low
     1 previous x,high
     2 previous y,low
     3 previous y,high
     4 current  x,low
     5 current  x,high
     6 current  y,low
     7 current  y,high
```

The pixels are dithered by using the Basic command Eor, and also swapping the colours — 0 and 1. What Eor does is give the opposite of 1 or 0, in fact reverses it, so 1 Eor 1 = 0, and 1 Eor 0 = 1.

The program therefore toggles between the colours as it moves across the screen by first using colour 0, then swapping to colour 1 for each alternate pixel.

The pixels are dithered up the screen by swapping the colours in a similar way to which numbers are swapped in a sorting routine.

How to use the routine.

First:
Set colour 0 by ?fc = desired colour number (0-15)
Set colour 1 by ?sc = desired colour number (0-15)
Second:
Call the procedure by PROCfill (x,y), where x is middle of shape, and y is base of shape +4.
Do not attempt to fill in any shape which does not have a black background.

```
  10MODE 7
  20PRINT"DEMONSTRATION (Y/N) :";
  30REPEAT:K%=GET:UNTILK%=78ORK%=89
  40IFK%=78 CLS:END
  50ONERRORPROCexample:REPEAT UNTIL
    GET=32:MODE7:END
  60MODE2
  70VDU23;8202;0;0;0;
  80block=&70
  90fc=&00:sc=&01:dc=&02
 100osword=&FFF1
 110SC%=0:FC%=0
 120FORAX%=0TO1200STEP80
 130FORAY%=1000TO100STEP-80
 140MOVEAX%,AY%:GCOL0,7
 150PLOT1,64,0:PLOT1,0,-64
 160PLOT1,-64,0:PLOT1,0,64
 170FC%=FC%MOD16:SC%=SC%MOD16
 180?fc=FC%:?sc=SC%
 190PROCfill(AX%+16,AY%-60)
 200FC%=FC%+1:NEXT:SC%=SC%+1:NEXT
 210REPEAT UNTIL GET=32
 220PROCexample
 230END
 330DEFPROCfill(AX%,AY%)
 340F%=0
 350A%=&D
 360X%=block MOD 256
 370Y%=block DIV 256
 380REPEAT
 390PLOT76,AX%,AY%
 400CALL osword:REM read coordinates
 410NX%=block?0+256*block?1
 420EX%=block?4+256*block?5
 430FOR S%=NX% TO EX% STEP 8
 440GCOL 0,fc?F%:REM colour 0 or 1
 450F%=F%EOR1:REM dither pixel colour
 460PLOT69,S%,AY%
 470NEXT
 480REM swap colours
 490?dc=?fc:?fc=?sc:?sc=?dc
 500F%=0
 510AY%=AY%+4
 520UNTILPOINT(AX%,AY%)<>0
 530ENDPROC
 540REM ****************************
 550:
 560DEFPROCexample
 570CLS
 580GCOL0,7
 590MOVE640,260:DRAW660,340
 600DRAW660,640:DRAW640,700
 610DRAW630,640:DRAW630,340
 620DRAW640,260
 630?fc=1:?sc=3
 640PROCfill(640,280)
 650GCOL0,7
 660MOVE630,640:DRAW600,790
 670MOVE660,640:DRAW690,790
 680MOVE630,560:DRAW500,700
 690DRAW400,600:DRAW500,460
 700DRAW630,540
 710MOVE660,560:DRAW790,700
 720DRAW890,600:DRAW790,460
 730DRAW660,540
 740?fc=5:?sc=7
 750PROCfill(500,464)
 760PROCfill(790,464)
 770GCOL0,7
 780MOVE660,540:DRAW800,400
 790DRAW740,340:DRAW660,340
 800MOVE630,540:DRAW500,400
 810DRAW550,340:DRAW630,340
 820?fc=4:?sc=7
 830PROCfill(616,344)
 840PROCfill(660,344)
 850PROCcirc(500,600,50)
 860PROCcirc(800,600,50)
 870?fc=5:?sc=4
 880PROCfill(800,554)
 890PROCfill(500,554)
 900PROCcirc(500,600,20)
 910PROCcirc(800,600,20)
 920?fc=3:?sc=7
 930PROCfill(500,584)
 940PROCfill(800,584)
 950REPEAT UNTIL GET=32:ENDPROC
 960:
 970DEFPROCcirc(X%,Y%,R%)
 980GCOL0,0
 990MOVEX%,Y%
1000FORN=0TO2*PI+.1STEP.1
1010MOVEX%,Y%
1020X=COSN*R%+X%:Y=SINN*R%+Y%
1030PLOT85,X,Y:NEXT
1040ENDPROC
```

Multiborder

Campbell Black and
Alasdair Hobbs,
Junpier Green,
Midlothian.

ENHANCE YOUR Spectrum screen displays with a multicoloured border. This machine-code routine can be called instead of using a Pause0. It can be customised by your program to give between two and six coloured borders.

Carefully type in and save the Basic loader — listing 1. Run the program. If you have entered it correctly, the code will have been poked into memory and you can save it.

Now type in and save the demonstration program — listing 2. Run the program. You should now see some examples of the routine's spectacular possibilities.

Using the routine in your own programs is straightforward. First

CLEAR 64999

The routine should then be loaded into memory. Your own program can then be load-

ed or entered. A few pokes are required before calling the routine. Poke 65089 with the number of colours required in the border. Poke 65081 with the number corresponding to the first colour, Poke 65082 with the second colour, and so on.

Finally, call the routine with

RANDOMIZE USR 65000

The border will remain multicoloured until a key is pressed. The addresses are summarised in table 1.

Table 1.

Start address	65000
No. of Colours	65080 Poke with a number between 2 and 6
1st colour	65081 Starting here, poke the required
2nd colour	65082 number of addresses with a number
3rd colour	65083 in the range 0-7
4th colour	65084
	0 = black 1 = blue 2 = red 3 = magenta 4 = green 5 = cyan
5th colour	65085
	6 = yellow 7 = white
6th colour	65086

Examine the demonstration listing to see how all the above was achieved from within a Basic program.

If you are saving and loading from Microdrive, change the syntax of the relevent lines in listings 1 and 2.

Listing 3 is the routine in assembly language. You will find this useful if you have an assembler and wish to incorporate it into a larger machine code program. If you want to relocate the routine, simply change the Org address. Note that the routine will only run in the top 32K of memory. Num is the variable holding the number of colours, Col is for the actual colours.

```
  10 REM
  20 REM **multiborder demo**
  30 REM
 100 CLEAR 64999
 110 LOAD "mborder"CODE
 120 LET a$="Pokes required for
this border "
 130 BORDER 7: INK 0: PAPER 7: C
LS
 140 LET s=65000
 200 FOR a=1 TO 2
 210 FOR n=2 TO 6
 220 CLS : PRINT TAB 10;"MULTIBO
RDER"
 230 PRINT ''a$
 240 POKE s+80,n
 250 PRINT '';CHR$ 244;s+80;CHR$
44;n
 260 PRINT
 270 LET c=n
 300 FOR b=1 TO c
 310 READ x
 320 POKE s+80+b,x
 330 PRINT CHR$ 244;s+80+b;CHR$
44;x
 340 NEXT b
 345 PRINT ''"PRESS A KEY"
 350 RANDOMIZE USR s
 360 NEXT n
 370 NEXT a
1000 DATA 1,2
1010 DATA 2,4,6
1020 DATA 2,3,4,5
1030 DATA 5,3,2,4,1
1040 DATA 6,5,4,3,2,1
1050 DATA 6,3
1060 DATA 5,5,4
1070 DATA 2,5,2,5
1080 DATA 6,6,1,1,1
1090 DATA 3,2,1,3,2,1
```

```
  10 REM **multiborder loader**
  15 LET c=0
  20 FOR n=65000 TO 65086
  30 READ x
  40 POKE n,x
  45 LET c=c+x
  50 NEXT n
  60 IF c<>8507 THEN PRINT "ERRO
R IN DATA": STOP
  70 SAVE "mborder"CODE 65000,87
 100 DATA 58,56,254,95,214,1,71,
33,48,254,221,33,54,254,35,16,25
3,78,221,113,1,71,33,43
 110 DATA 254,35,16,253,126,221,
119,0,118,83,33,57,254,126,211,2
54,221,70,0,221,78,1,13,32,253,1
6,248,175,219,254
 120 DATA 47,230,31,192,35,21,32
,231,24,224,0,0,0,0,200,185,167,
182,191,9,6,4,3,2,0,0,0,0,0,0,0,
0,0
```

Sultan's Tower

Remko Blakenburgh,
Leiden,
Holland.

ZX-81

SULTAN'S TOWER is an original, fast-moving action game which consists for the most part of machine-code. The scene is laid in Arabia in the middle ages. Fatima, the girl-friend of the Arabian prince Achmed, has been kidnapped by the wicked Sultan of Bahrain and put in his harem. She is detained on the upper floor of a tower, which consists of 10 floors.

You play the part of Achmed, who would rather keep his girl for himself. You must save Fatima but, to do so, you must reach the ninth floor starting off from the ground level. Each floor is divided into six parts which lie above each other. You must start off from the bottom part and ascend using ladders and ropes.

At the left of the upper part there is a doorway leading to the floor above you. When you have reached the upper part of the ninth floor you must grasp Fatima and run back downward. You can use slides to move down quickly. To descend to a floor below you, you should use the doorway at the left of the lower part of the floors.

When you have reached the ground level, you can leave the tower by walking through the exit at the left of the lower part and have a happy life together with Fatima. Unfortunately, it's rather difficult to save girls from harems. On every floor, harem-guards are busy chasing you. You had better beware of them because you will be sentenced to imprisonment for life if they get you.

As you progress, more harem-guards will be employed by the ugly sultan to make life hard for you. Each time you reach another floor, two more guards will try to make an end of your freedom.

Sometimes the harem-guards fall into holes. In that case, a guard can't harm you very much but after some time he will climb down to the part below him using a rope. You can use this rope later to climb up or down.

Your time to complete your mission is limited. If you run out of time, a pretty big bomb at the bottom of the tower will explode, destroying the tower with you and your girl.

The keys used to control the game are:

I — up/jump
J — down
Y — right
T — left
O — hold

If you are not pleased with these key controls you can change them by poking:

16830, code of key for hold
16838, code of key up
16845, code of key down
16852, code of key left
16859, code of key right

You can abandon a game by pressing Shift on its own.

The machine-code is held in one large Rem-statement with line number zero. Before entering the machine-code, you must obtain this line. To do so, enter a line

1 REM

followed by 128 characters — that's four full lines. Then, edit this line and change the line number to 2. Continue this procedure until you have lines 1-11. Finally, enter a line

12 REM

followed by 77 characters.

You can check whether your lines have the correct length by entering:

PRINT PEEK 16396 + 256 × PEEK 16397 — 16509

You should get the number 1557. If not, check your lines and correct them where necessary. Now enter as direct commands, in succession:

POKE 16510,0
POKE 16511,17
POKE 16512,6
POKE 16514,118
POKE 16515,118

You now have a massive Rem-statement of 1551 characters long with line number 0. Type in the hex-loader and enter the hex codes. I advise you to save the program at regular intervals in order to prevent you from losing all your work when a crash occurs.

After having entered the hex-codes, delete the hex-loader and type in the Basic program. Now save the program by entering:

RUN 9900

The way in which the program is saved may seem a bit cumbersome, but it is actually a means of reducing saving and loading time. It works like this: before saving, the system variable Ramtop is set to 0, whereby the display-file is reduced to its minimal size. Now the program is shortened for about 750 bytes, so loading time is considerably reduced. After saving, Ramtop will get back its previous value, 128, which causes the display-file to take its normal size.

I am aware of the fact that typing in machine-code programs can be rather tedious. Therefore, I will send you a tape version of my game if you send £3 to Remko Blakenburgh, Korenbloem 34, 2317 KX Leiden, Holland.

The hex loader.

```
 99 REM HEX LOADER
100 PRINT "START ADDRESS"
110 INPUT S
120 PRINT "FINISH ADDRESS"
130 INPUT F
140 FOR N=S TO F STEP 8
150 LET T=0
160 PRINT N;" - ";
170 INPUT A$
180 PRINT A$;" = ";
190 INPUT TOT
200 PRINT TOT
210 LET Z=0
220 FOR K=1 TO LEN A$ STEP 2
230 LET C=(CODE A$(K)-28)*16+CO
DE A$(K+1)-28
240 LET T=T+C
250 POKE N+Z,C
260 LET Z=Z+1
270 NEXT K
280 IF TOT=T THEN GO TO 310
290 PRINT "ERROR - PLEASE INPUT
AGAIN"
300 GO TO 150
310 NEXT N
```

(continued from previous page)

Program 1.

```
 100 POKE 16415,0
 120 CLS
 130 PRINT "********************
*************  S U L T A N""S
T O W E R   ********************
*************"
 140 PRINT ,,"CHARACTERS:"
 150 PRINT ,,"X = YOU","█ = YOU
+ FATIMA",,"Y = FATIMA","S = HAR
EM-GUARD"
 160 PRINT ,,"K E Y S :",,,,"T=L
EFT","Y=RIGHT",,,"I=UP/JUMP","J=
DOWN",,,"0=HOLD","SHIFT=STOP GAM
E"
 200 PRINT ,,,"PLEASE CHOOSE GA
ME LEVEL (1-3)",,,"GAME LEVEL =
?"
 210 LET K$=INKEY$
 230 IF K$<"1" OR K$>"3" THEN GO
TO 210
 240 PRINT AT 21,13,K$
 250 POKE 16527,17-2+VAL K$
 260 PRINT ,,"         PRESS ANY KEY
 TO PLAY         "
 265 IF INKEY$<>"" THEN GOTO VAL
"265"
 270 IF INKEY$="" THEN GOTO VAL
"270"
 280 CLS
 290 RAND USR 16516
 295 CLEAR
 300 FOR D=0 TO 130
 310 NEXT D
 320 RUN
9900 FAST
9910 POKE 16389,0
9920 CLS
9930 SAVE "S█"
9940 POKE 16389,128
9950 CLS
9960 SLOW
9970 RUN
```

The hex dump.

```
16514: 7676FD362105FD36 = 888
16522: 4800FD367C0DCDEA = 955
16530: 40ED7346402A3440 = 708
16538: 223240CDF540CD92 = 1013
16546: 41CD8B44CDB141CD = 1129
16554: 2245CDE843ED5B7B = 1056
16562: 40CD4B433A2640FE = 825
16570: FE20E9ED7B4640C9 = 1214
16578: 0100FFFFDFFF2100 = 1022
16586: 2631343437001C00 = 279
16594: 0000000000000000 = 0
16602: 0000000000000039 = 57
16610: 2E322A121E1C1C5C = 334
16618: 2A0C402311CA40CD = 641
16626: DD43C92A0C401164 = 724
16634: 000E060620193680 = 265
16642: 2310FB0D20F50E0A = 616
16650: CD77437EFE8020F8 = 1179
16658: 0604112100362D19 = 184
16666: 10FB0D20EB2A0C40 = 665
16674: 116400190E05EB06 = 402
16682: 02CD5343E61F6F26 = 767
16690: 00197EFE8020F2E5 = 1036
16698: D511DFFF19D17EE1 = 1293
16706: A720E6368A10E221 = 896
16714: 840019EB0D20D80E = 667
16722: 05CD77432B2B2B06 = 531
16730: 057EFE8020F32310 = 839
16738: F82B2B0604112000 = 393
16746: 36181910FB0D20E1 = 640
16754: 2A0C40110700197E = 293
16762: 113C001936B4FE25 = 627
16770: 2002363E11940219 = 342
16778: 36B6FE1CC03693C9 = 1112
16786: 210000223C402A0C = 245
16794: 4011D7023A4840CB = 695
16802: 4728031143001922 = 257
16810: 3E407E324040C9ED = 868
16818: 4B2540793C2804CD = 606
16826: BD077EFE1CCCB443 = 1055
16834: 210000FE2E200321 = 401
16842: DFFFFE2F20032121 = 880
16850: 00FE39200321FFFF = 889
16858: FE3E200321010022 = 419
16866: 3C402A3E407EFE24 = 708
16874: CA8442112100193A = 533
16882: 4040FE0E2818FE2D = 762
16890: 28177EA7280FFE18 = 689
16898: 200F3A3C40FE0128 = 524
16906: 08FEFF2804ED533C = 941
16914: 407EA720142B7EFE = 832
16922: 18200E3A4040FE18 = 534
16930: 2007112000ED533C = 468
16938: 402A3E403A404077 = 537
16946: ED5B3C40197EFE76 = 975
16954: 2843FE80283FFE8A = 984
16962: 283BFE24283C3240 = 603
16970: 40223E40363D473A = 468
16978: 4840CB4F78280236 = 634
16986: BDE52A3C40477CB5 = 960
16994: E1C878FEB4284BFE = 1348
17002: B62847FE3EF5CC30 = 1106
17010: 43F1FE93C03A4840 = 1095
17018: CB4F2063C92A3E40 = 782
17026: 18CA060711002036 = 342
17034: BDCD4B433624CD48 = 906
17042: 4310F40605110014 = 375
17050: CDA343CD4B4310F8 = 1046
17058: 11A842C32344392D = 651
17066: 2A3E002C3439003E = 319
17074: 347A214840CB86FE = 934
17082: B4F5CC3744F1F5C4 = 1434
17090: 56442A0C40110700 = 296
17098: 1934F12807353521 = 504
17106: 4840CBC621214034 = 719
17114: ED7B4840C3934011 = 917
17122: 0080CD4B43CD7A44 = 870
17130: 2A0C4011740119E5 = 506
17138: 111143CDDD43D506 = 813
17146: 0A11000FCD4B43CD = 594
17154: A34310F8D1E12BCD = 1176
17162: DD43ED7B4640C928 = 1023
17170: 34332C37263931A31 = 404
17178: 26392E343378322E = 460
17186: 38382E3433002834 = 353
17194: 3235312A396A060E = 377
17202: 1100103630CD4B43 = 495
17210: 36BECD4B4310F421 = 884
17218: 4840CBCEAF324040 = 898
17226: C9D51B7AB320FBD1 = 1234
17234: C9E5D52A32400CBC5 = 1199
17242: 845D292921292929 = 407
17250: 1922324037CD1E1C9 = 932
17258: C5473A2540FEFE78 = 1056
17266: C1C0C33C7ACD5343 = 1117
17274: CD6A43E607FE0530 = 922
17282: F46F26002929545D = 652
17290: 2929292929191164 = 347
17298: 0019ED580C4019CD = 659
17306: 5343E61F5F160019 = 553
17314: C9D53EFFED471100 = 1056
17322: 05CD4B433E1EED47 = 752
17330: D1C9F52A0C401105 = 795
17338: 0319E511D543CDDD = 980
17346: 43E13A26403C20FA = 794
17354: 3A26403C28FACDDD = 938
17362: 43F1C92D34316980 = 888
17370: 8080C01ACB77CBB7 = 1182
17378: 77231328F6C92A0C = 714
17386: 401120001 97EFE12 = 536
17394: CAFF433D77FE1BC0 = 1177
17402: 36252B18F00E0205 = 420
17410: 1E3E1F90ED471100 = 592
17418: 04CD4B4310F30D20 = 655
17426: EE11184418 0B3E34 = 496
17434: 3A0027312A3C002E = 294
17442: 79D5CD7A442A0C40 = 847
17450: 117501190D1CDDD43 = 862
17458: ED7B4640C90616C5 = 920
17466: 2A0C401118 0319E5 = 416
17474: 11DFFF19D101D602 = 946
17482: EDB811000 8CD4B43 = 793
17490: C110E4C90617C52A = 906
17498: 0C401121 0019E519 = 405
17506: D101D602EDB0EB06 = 1080
17514: 2023360010FB1100 = 405
17522: 08CD4B43C110DFC9 = 988
17530: 2A0C400E18062023 = 229
17538: 360010FB230D20F5 = 646
17546: C93A2140472A1040 = 549
17554: E52A0C40CD6A43CD = 930
17562: 5343CB3F5F16003A = 591
17570: 2140B62808CB13CB = 754
17578: 12CB13CB12197EA7 = 779
17586: 20DFE51121001 97E = 685
17594: E1FE8020D4EBE173 = 1426
17602: 2372233600233600 = 327
17610: 233600231 0C2C921 = 568
17618: C240875F1600195E = 629
17626: 2356C94F3A4340E6 = 820
17634: FC47CD5343CB4778 = 1072
17642: 2802CBC732434079 = 746
17650: 214340CB56C8CB96 = 1006
17658: AF32444079C9E53A = 966
17666: 2140472A10405E23 = 419
17674: 56232323 23E3E5A7 = 849
17682: ED52E1E3280510EE = 1070
17690: C33C7A2B2B7EE1C9 = 1015
17698: 3A2140472A1040C5 = 545
17706: E51141400105 00ED = 618
17714: B03A4340CB5F280C = 715
17722: 21454035C27D4621 = 641
17730: 4340CB9E3A4040A7 = 845
17738: 2826FE1828220604 = 440
17746: 783D4FCDD1442A41 = 849
17754: 40197ECBBFFE3D79 = 1045
17762: 280410EC180A473A = 459
17770: 4340E6FC80324340 = 970
17778: 3A4340E603CDD144 = 904
17786: 2A4140197EFE8020 = 736
17794: 0A473A4440FE2D78 = 690
17802: C4DD44FE0ECCDD44 = 1246
17810: FEA4CCDD442A4140 = 1082
17818: 112100197EFE8A28 = 633
17826: 0EA72808FE18200F = 557
17834: 3A4340CB5728083A = 585
17842: 4340F603243407E = 887
17850: FE2D20243A4440FE = 811
17858: 2D281D3A4340E603 = 536
17866: FE022005CDDD4418 = 811
17874: 0FCD5343CB472808 = 692
17882: 3A4340F603324340 = 619
17890: 3A4440FE2D202B2A = 806
17898: 414011 2100197EFE = 584
17906: 2D281F3A4340E603 = 538
17914: FE032005CDDD4418 = 812
17922: 11CD5343CB47280A = 696
17930: 3A4340CB57CBCF32 = 987
17938: 43403A4440FE8A20 = 745
17946: 182A414036A43E0E = 489
17954: 32444021 4340CBD6 = 763
17962: CBDE3E1E32454018 = 724
17970: 4A2A41403A444077 = 554
17978: 3A4340E603E5CDD1 = 1065
17986: 44E1197EFE762811 = 873
17994: 473A4040FEB47820 = 843
18002: 1247CBBFFE3D7820 = 950
18010: 0A3A4340EE013243 = 555
18018: 4018CEFE24CC0045 = 857
18026: E5214340CB56E128 = 947
18034: 023E0E3244403624 = 350
18042: 224140E1E8214140 = 785
18050: 010500EDB0EBC105 = 852
18058: C22945C9C33C7A76 = 1000
18066: 00011900EA303400 = 360
```

Battle Tank

David Yip,
Carlisle,
Cumbria.

Oric

THE AIM OF the game is to destroy the enemy tank. In order to do so, you must shoot away the blocks between you and your enemy first — the number of blocks varies. It sounds simple but the catch is that you can only fire a maximum of three shots and a minimum of one shot. You and the other tank will fire at the blocks alternately. The game can be played by one or two players.

One player: You play against the computer and you have five lives. Every time you destroy an enemy tank, you get one point and the computer's intelligence level increases.

```
10 REM    *** BATTLE TANK ***
20 TEXT:CLS
30 PAPER 0:INK7
40 REM  >> REDEFINE CHARACTERS <<
50 FOR X=46856 TO 46975
60 READ A
70 POKE X,A
80 NEXT X
90 DATA 0,1,3,1,15,31,10,7          'a
100 DATA 0,56,63,60,63,63,42,63     'b
110 DATA 0,0,62,0,0,48,32,0         'c
120 DATA 0,0,12,0,0,0,0,0           'd
130 DATA 30,30,30,30,30,30,30,30    'e
140 DATA 0,0,31,0,0,3,1,0           'f
150 DATA 0,7,63,15,63,63,13,63      'g
160 DATA 0,32,48,32,60,62,20,56     'h
170 DATA 0,0,0,0,0,12,18,18         'i
180 DATA 0,0,0,1,0,2,1,1            'j
190 DATA 0,0,30,12,51,33,30,12      'k
200 DATA 0,0,0,32,0,16,32,32        'l
210 DATA 1,4,1,10,5,34,15,8         'm
220 DATA 0,18,12,51,12,45,18,51     'n
230 DATA 32,8,32,2,40,17,44,8       'o
240 H=0
250 REM  >> TITLE <<
260 CLS
270 FOR X=£BBA8 TO £BC97 STEP 40
280 POKE X,22
290 NEXT X
300 PRINT CHR$(4)
310 PRINT SPC(7) CHR$(27);"A";CHR$(27);
"JB A T T L E   T A N K"
320 PRINT CHR$(4)
330 PRINT SPC(12) CHR$(27);"@";CHR$(96)
;" DAVID YIP"
340 PRINT:PRINT:PRINT:PRINT
350 PRINT"HOW MANEY PLAYERS (1 OR 2) :"
;
360 GET A$
370 IF A$="1" THEN P=1:GOTO 400
380 IF A$="2" THEN P=2:GOTO 400
390 GOTO 360
400 PRINT A$
410 S=0:G=0
420 T(1)=5:T(2)=5
430 L=4
440 REM  >> SCREEN LAYOUT <<
450 FOR X=£BE20 TO £BEC7 STEP 40
460 POKE X,22
470 NEXT X
480 POKE £BDB0,18
490 PLOT 15,14,"BLOCK ="
500 PLOT 0,17,0
```

(continued on page 110)

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(continued from page 108)

```
510 PLOT 6,17,"PLAYER 1                    SCO
RE"
520 PLOT 1,18,3
530 PLOT 20,18,P-1
540 PLOT 2,18,"abc abc abc abc"
550 PLOT 29,18,"0"
560 IF P=1 THEN 590
570 PLOT 23,18,"fgh fgh fgh fgh"
580 PLOT 27,17,"PLAYER 2"
590 POKE £268,7:PRINT
600 IF P=2 THEN PRINT:GOTO 620
610 PRINT SPC(11) CHR$(27);"AHI SCORE =
";H
620 PRINT"
"
630 PRINT:PRINT:PRINT
650 REM  >> BLOCKS <<
660 PLOT 2,12,"
    "
665 PLOT 1,12,3
670 PLOT 2,12,"abc"
680 PLOT 32,12,"fgh"
690 FOR X=6 TO 31
700 PLOT X,12,1
710 NEXT X
720 BL=INT(RND(1)*9)+17
730 X=INT((27-BL)/2)
740 PLOT 4+X,12,4
750 FOR Y=5+X TO 4+BL+X
760 PLOT Y,12,"e"
770 NEXT Y
780 PLOT 22,14,STR$(BL)
790 PLOT 22,14,7:G=G+1
800 REM  >> GAME BEGINS <<
810 IF G/2=INT(G/2) THEN 1120
820 POKE £268,21:PRINT
830 PRINT"PLAYER 1":PRINT
835 PLOT 24,23,"   "
840 PRINT" HOW MANY SHOTS (1-3) :";
845 A$=KEY$+KEY$+KEY$
850 GET A$:A=VAL(A$)
860 IF A>3 OR A<1 THEN 845
870 PRINT A$
880 A=A-1:X=5
885 GOTO 930
890 PLOT X,12,1
900 X=X+1
910 IF SCRN(X,12)=101 THEN 950
920 IF SCRN(X,12)=102 THEN 1010
930 PLOT X,12,"d"
940 GOTO 890
950 SHOOT:BL=BL-1
960 PLOT X,12,4
965 PLOT 23,14,"  "
970 PLOT 22,14,STR$(BL)
980 PLOT 22,14,7
990 IF A=0 THEN 1120
995 WAIT 20
1000 GOTO 880
1010 GOSUB 1520
1020 IF P=2 THEN 1080
1030 S=S+1
1040 PLOT 28,18,STR$(S)
1050 PLOT 28,18,0
1060 L=L+1
1070 GOTO 650
1080 T(2)=T(2)-1
1090 PLOT T(2)*4+19,10,"    "
1100 IF T(2)>0 THEN 650
1110 W=1:GOTO 1660
1120 POKE £268,21:PRINT
1130 IF P=1 THEN 1210
1140 REM  >> PLAYER 2<<
1150 PRINT"PLAYER 2":PRINT
1160 PLOT 24,23,"   "
1170 PRINT" HOW MANY SHOTS (1-3) :";
1175 A$=KEY$+KEY$+KEY$
1180 GET A$: A=VAL(A$)
1190 IF A>3 OR A<1 THEN 1175
1200 PRINT A$:GOTO 1290
1210 REM  >> COMPUTER <<
1220 PRINT" ORIC :    ":PRINT
1230 A=INT(RND(1)*3)+1
1240 IF BL>L THEN 1280
1250 IF (BL+1)/4=INT(BL/4)+1 THEN 1280
1260 A=((BL+1)/4-INT(BL/4))*4
1280 PRINT"I FIRE ";A;"SHOTS
"
1285 WAIT 50
1290 A=A-1:X=31
1300 GOTO 1350
1310 PLOT X,12,1
1320 X=X-1
1330 IF SCRN(X,12)=101 THEN 1370
1340 IF SCRN(X,12)=99 THEN 1420
1350 PLOT  X,12,"d"
1360 GOTO 1310
1370 SHOOT:BL=BL-1
1375 PLOT X,12,4
1376 PLOT 23,14,"  "
1380 PLOT 22,14,STR$(BL)
1390 PLOT 22,14,7
1400 IF A=0 THEN 820
1405 WAIT 20
1410 GOTO 1290
1420 GOSUB 1500
1430 T(1)=T(1)-1
1435 IF T(1)=0 THEN 1460
1440 PLOT T(1)*4-2,18,"    "
1450 GOTO 650
1460 W=2
1470 IF P=2 THEN 1660
1480 GOTO 1600
1490 REM  >> HIT <<
1500 X=2:PLOT 1,12,1
1510 GOTO 1530
1520 X=32
1530 PLOT X,12," i "
1540 EXPLODE
1545 WAIT 30
1550 PLOT X,12,"jkl"
1560 EXPLODE
1565 WAIT 50
1570 PLOT X,12,"mno"
1580 WAIT 300:RETURN
1590 REM  >> GAME OVER <<
1600 PLOT 1,9,1:PLOT 1,10,1
1610 PLOT 2,9,14:PLOT 2,10,14
1620 PLOT 11,9,"G A M E  O V E R"
1630 PLOT 11,10,"G A M E  O V E R"
1640 IF S>H THEN H=S
1650 WAIT 1000:GOTO 250
1660 POKE £268,21:PRINT
1665 PRINT"WELL DONE PLAYER ";W:PRINT
1670 PRINT"YOU HAVE WON BY ";T(W);"TANK
(S)"
1680 WAIT 1000:GOTO 250
```

Header reader

H.V. Smith,
Brecon,
Powys.

Amstrad

I HAVE WRITTEN a program similar to ones published previously for other computers e.g. the ZX Spectrum or the Amstrad CPC-464. It is a program written in Basic with a short accompanying Z-80 machine-code routine which reads the header at the beginning of a file on tape and interprets this to give the user the information recorded there, which is normally inaccessible to the user.

On running, the program first returns the screen display to its default conditions as at startup when switching on. This is achieved by the two calls to the firmware jumpblock: Call &BBFF and Call &BB4E. Using these two simple calls avoids having to reset all the seperate aspects of the screen display i.e. the Mode, Pen, Paper, Ink settings etc. These two calls are in fact quite useful in any program at the beginning to make sure that the effect of printing on the screen can be entirely predictable.

It then calls the subroutine at line 230 and onwards which simply pokes in the short machine code routine at 41000 onwards. It also lowers Himem to 39999 to give space for the routine and for the storage of the data obtained from the header, the amount of space allocated being in fact more than adequate, though this fact is unlikely to mean that there is unsufficient memory left for use by any program residing in memory, mainly because it is unlikely that any program other than the header reader would be in the memory.

The program then calls the machine code routine which starts the tape and searches for the header at the beginning of a file. Since the routine uses quite a low level Rom routine

```
10 REM ********************************
20 REM **  (c) Howard V. Smith 1985  **
30 REM ********************************
40 CALL &BBFF:CALL &BB4E
50 GOSUB 230
60 POKE 40030,0:CALL 41000:IF PEEK(40030)=253 THEN PRI
NT"ESCape pressed...":PRINT:GOTO 210 ELSE IF PEEK(4003
0)<>0 THEN PRINT"Tape Er
ror":PRINT:GOTO 210
70 PRINT SPACE$(7);"Tape Header Reader :":PRINT CHR$(2
2);CHR$(1);CHR$(11);SPACE$(7);STRING$(18,"_");CHR$(22)
;CHR$(0)
80 PRINT:PRINT:PRINT"Filename : ";:t=0:FOR a=40000 TO
40015:PRINT CHR$(PEEK(a));:t=t+PEEK(a):NEXT:IF t=0 THE
N PRINT"Unnamed File";
90 PRINT:PRINT:PRINT"Block Number :";PEEK(40016)
100 PRINT:PRINT"Last Block ? : ";:IF PEEK(40017)=0 THE
N PRINT"No."ELSE PRINT"Yes."
110 PRINT:PRINT"File Type : ";:a=PEEK(40018)
120 a$=BIN$(a,8)
130 t=VAL(MID$(a$,5,3)):IF t=0 THEN PRINT"BASIC Progra
m"ELSE IF t=1 THEN PRINT"Binary File"ELSE IF t=2 THEN
PRINT"Screen Image"ELSE
IF t=3 THEN PRINT"ASCII File"ELSE PRINT"Unknown."
140 PRINT:PRINT"Protected ? : ";:IF VAL(RIGHT$(a$,1))=
1 THEN PRINT"Yes."ELSE PRINT"No."
150 PRINT:PRINT"Length Of Data In Block :";PEEK(40019)
+256*PEEK(40020);"Bytes"
160 PRINT:PRINT"Address From Which Written :";PEEK(400
21)+256*PEEK(40022)
170 PRINT:PRINT"First Block ? : ";:IF PEEK(40023)=0 TH
EN PRINT"No."ELSE PRINT"Yes."
180 PRINT:PRINT"Total Length Of File :";PEEK(40024)+25
6*PEEK(40025);"Bytes"
190 PRINT:PRINT"Entry Address : ";:a=PEEK(40026)+256*P
EEK(40027):IF a THEN PRINT a ELSE PRINT"N/A"
200 LOCATE 1,25
210 PRINT"Continue...?":k$="":WHILE k$="":k$=INKEY$:WE
ND:CLS:IF LOWER$(k$)<>"n"THEN 60
220 END
```

(continued on facing page)

which does not give the user a prompt to press Play on the tape recorder, it is a good idea to the cassette installed in the datacorder and to have Play depressed before running the program though this is not essential. The actual machine code routine is as follows:

Hex.	Mnemonic	Comments.
3E 2C	LA A, &2C	; loads the parameters
21 40 9C	LD HL, &9C40	; for the routine into
11 40 00	LD DE, &0040	; A, HL, and DE.
CD A1 BC	CALL &BCA1	; calls the Rom routine
D8	RET C	; returns to Basic if OK
C6 FD	ADD A,&FD	; generates an error byte
32 5E 9C	LD (&9C5E),A	; which is placed in &9c5e
C9	RET	; returns to Basic

The Basic program then checks by Peeking location 40030 whether the routine called has been successful or whether an error has occurred. It also checks whether the user hit the Escape key during the Rom routine which halts its action, and acts accordingly.

If the routine has run correctly then the program interprets the data stored at locations 40000 to 40063. In fact only the locations from 40000 to 40027 contain useful information, although the bytes in the header stored from 4028 to 40063 can contain useful information when the file is not created by Basic tape commands. In any case, whatever information this may be, it cannot be interpreted in terms such as block number or similar in the same way as the other bytes. Indeed, the information stored here is likely to have a unique purpose for every program in which they are used at all.

The program displays the information under the headings Filename, Block Number, File type, Length of Data in Block, Address from which the file was written, Total length of file, the Entry Address in the case of machine code programs, and also says whether the block being read is the first or the last block or not and whether or not the program is protected.

Once the information has been displayed, the program pauses and asks whether the user wishes to continue to read another header. Any key other than n is taken to mean yes, while if n is pressed, the program ends. Otherwise, the program repeats the process, searching for another header. The time between when the Continue . . .? message is displayed and when a key is pressed is a good time to change tapes, fast forward etc.

It would also probably be convenient, if the user owns a printer to change the appropriate Print statements to Print 8 statements to obtain a hard copy of the header information for later use.

I should be most happy to answer reader's inquiries about the program should any arise providing that the inquirer encloses an sae with any questions sent to me. I also am willing to provide a tape copy of this program to any reader if they send a blank tape and a cheque/PO for £1.00 inclusive of p&p to H.V. Smith, Upper Danyparc, Llandefalle, Brecon, Powys LD3 0UN.

```
230 REM machine code
240 MEMORY 39999
250 DATA 3e,2c,21,40,9c,11,40,0,cd,a1,bc,d8,c6,fd,32,5
e,9c,c9
260 FOR a=41000 TO 41017:READ b$:POKE a,VAL("&"+b$):NE
XT
270 RETURN
```

Tape back-up

David Brankin,
Thornbury,
Bristol.

Spectrum

I HAVE CREATED the ultimate tape back-up program for the ZX Spectrum. It is very reliable and can copy any program. It can even copy music. It can back-up any length program — 1000000K+ — and only takes up nine bytes.

It works by taking in a signal from the mic and putting it out the ear to another tape recorder. The only disadvantage of this system is that you have to pull the plug upon finishing. Note that the border doesn't change colour.

Spectrum tape back-up. Idea by J.Evans

```
 1 REM Code by D.Brankin
10 FOR n=USR "a" TO USR "a"+8
20 READ a: POKE n,a: NEXT n
30 DATA 243,14,254,237,120,237,121,24,250
40 RANDOMIZE USR USR "a"
```

Teeth Eater

Paul Kinnaird,
Belfast.

Vic-20

THIS GAME is for the unexpanded Vic-20. It loads in two parts. Part 1 pokes the graphics into the memory, prints up the name of the game, Teeth Eater, and automatically loads the main game — part 2 — using a short machine-code routine.

You are a toothpaste tube and you must stop the bacteria from eating away at the teeth. You may move left and right by using the keys Z and X and you may shoot using the space-bar. You have one minute to hit as many bacteria as possible. For each bacteria you hit you get 100 points. A high score is kept and displayed at the end of each game. If the bacteria gets to the toothpaste tube you will be contaminated and the game will be over.

```
280 FORT=0TO95:READA:POKE7168+T,
A:NEXT
300 DATA254,254,254,254,254,254,
254,254
310 DATA127,127,127,127,127,127,
127,127
320 DATA31,63,127,255,255,255,25
5,255
330 DATA240,248,252,254,254,254,
254,254
340 DATA255,255,255,255,255,255,
255,255
350 DATA255,255,255,255,255,127,
63,31
360 DATA254,254,254,254,254,252,
248,240
370 DATA255,126,126,126,94,94,94
,94
380 DATA94,94,94,94,126,60,24,24

390 DATA126,219,255,255,195,126,
36,102
400 DATA24,0,24,0,24,60,60,24
410 DATA145,82,0,0,214,0,82,145
500 POKE36879,8:PRINT"■"
510 PRINT"■■■■■      ■■■■ ■■ ■■
■■ ■■ ■■■■";
520 PRINT" ■E ■E ■T ■H■■■■■■"
530 PRINT"■      ■■■■■ ■■   ■■■■
■■    ■■■";
540 PRINT" ■A ■T ■E ■R■■■";
545 PRINT"■"
550 POKE828,169:POKE829,2:POKE83
0,141:POKE831,199:POKE832,0:POKE
833,169:POKE834,131
560 POKE835,141:POKE836,119:POKE
837,2:POKE838,169:POKE839,13:POK
E840,141:POKE841,120
570 POKE842,2:POKE843,96
580 SYS(828)


10 PRINT"■":POKE36879,29
20 PRINT"■    TYPE IN SPEED"
25 PRINT"■■■(0:FASTEST-10:SLOWES
T)"
26 PRINT"■"
30 INPUTVS
35 IFVS<0ORVS>10THEN10
36 VS=VS*20
55 HS=0
60 FORT=7168+32*8TO7168+32*8+7:P
OKET,0:NEXT
90 POKE36869,240
100 S1=36874:S2=36875:S3=36876:S
4=36877:V=36878
101 G=7790:H=7812:G1=38510:H1=38
532:A=8052:A1=38772:SC=0
105 POKE36879,8:PRINT"■■■■■■■■ TO
 START GAME PRESS"
110 PRINT"■■■■    ■■
 "

120 PRINT"     ■ S P A C E  "
130 PRINT"     ■              "
140 GETA$:IFA$=""THEN140
150 IFA$=" "THEN170
160 GOTO140
170 POKEV,15
175 GOSUB5000
180 FORT=140TO254:POKES1,T:POKES
2,T:POKES3,T:NEXT
```

(continued on next page)

(continued from previous page)

```
190 FORT=15TO0STEP-.05:POKEV,T:N
EXT
195 POKEV,15:POKES1,0:POKES2,0:P
OKES3,0
200 POKE36879,10
210 PRINT"■";
215 FORT=1TO4:POKE36869,255
220 PRINT"DDDDD@DDDD@DDDD@DDDDD@
";
225 NEXT
230 PRINT"EDDDDFEDDDFEDDDFEDDDDF
"
240 PRINT"■■■■■■■■■■"
250 PRINT"EDDDDCBDDDCBDDDCBDDDDC
";
260 FORT=1TO4
270 PRINT"DDDDD@DDDD@DDDD@DDDDD@
";
280 NEXT
290 TI$="000000"
295 FORT=0TOVS:NEXT
300 IFG=7790THENG=7791:H=7813:G1
=38511:H1=38533
301 IFG=7811THENG=7810:H=7832:G1
=38530:H1=38550
302 POKEG,7:POKEH,8:POKEG1,5:POK
EH1,5
303 GOSUB1000
305 POKEG-1,32:POKEG+1,32:POKEH-
1,32:POKEH+1,32
310 GETA$
320 IFA$="Z"THENG=G-1:H=H-1:G1=G
1-1:H1=H1-1
330 IFA$="X"THENG=G+1:H=H+1:G1=G
1+1:H1=H1+1
348 REM ** MOVE BAC **
350 POKEA,9:POKEA1,6:POKEA+1,32
360 A=A-1:A1=A1-1:POKEV,0:POKEV,
15
365 FORT=0TOVS:NEXT
370 IFA=HTHEN700
410 IFA$=" "THEN430
420 GOTO300
430 R=H+22:R1=H-30720
431 POKES4,140:POKES3,140
440 POKER1,7:POKER,10
450 IFR>7855THENPOKER-22,32
460 R=R+22:R1=R1+22:POKER,10
470 IFR-1=ATHENPOKER,11:FORT=1TO
10:POKEA1,2:NEXT:POKEA1+1,32:SC=
SC+100:GOSUB600
490 IFR>8030THENPOKER,32:POKER-2
2,32:POKES4,0:POKES3,0:GOTO300
495 POKE198,0
500 GOTO440
600 PRINT"■■■■■■■■■■■■■■■■■■■■■■
■■SCORE:";SC;"■"
610 POKEA,32:POKEA1,0
620 A=8052:A1=38772:RETURN
700 PRINT"■":Q=36879:Y=7:X=15:FO
RI=1TO30
710 FORT=YTOX:POKEQ,T::POKEQ,8:P
OKEV,T:POKES1,T+150:POKES3,T+150
:NEXT
720 PRINT"■        HARD LUCK
  ■";
730 PRINT"■";
740 NEXT
750 PRINT"■■■■■■■■";
760 FORT=1TO2:PRINT"■■■■■
     ■":NEXT
770 PRINT"■■■■ THEY GOT YOU ■"
780 FORT=1TO2:PRINT"■■■■■
     ■":NEXT
790 FORT=15TO0STEP-.05:POKEV,T:N
EXT
800 IFSC>HSTHENHS=SC
810 PRINT"■"; POKE36869,240
820 PRINT"■■■■■■ ┌──────────────
──────┐"
830 PRINT"│                     │"
840 PRINT"│                     │"
850 PRINT"│     HIGH SCORE      │"
860 PRINT"│                     │"
870 PRINT"│                     │"
875 PRINT"│                     │"
880 PRINT"└─────────────────────┘"
890 PRINT"■■■■■■■■■■■■■■■■■■■■■■■"
;HS
900 GOSUB5000:GOTO60
1000 PRINT"■■ ";TI$
1010 IFVAL(TI$)=100 THEN1100
1020 RETURN
1100 PRINT"■■       TIME UP!!!
  ■"
1110 FORT=1TO500:NEXT
1120 GOTO800
5000 FORT=1TO35
5010 READN6,L6
5020 POKES2,N6:POKES3,N6:FORP1=1
TOL6*211:NEXT
5030 POKES2,0:POKES3,0
5040 NEXT
5060 RESTORE
5070 RETURN
5100 DATA219,.5,223,.5,227,1,228
,2
5110 DATA219,.5,223,.5,227,1,228
,2
5120 DATA231,1,228,1,217,.5,217,
.5,219,1
5130 DATA231,2,228,.125,231,.125
,228,.125,227,.125,228,1
5140 DATA228,2,227,.125,228,.125
,227,.125,223,.125,227,1
5150 DATA227,2,223,.125,227,.125
,223,.125,219,.125,223,1
5160 DATA223,1,219,.5,217,.5,219
,2
```


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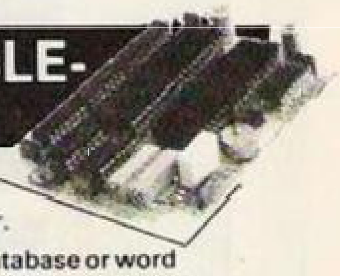


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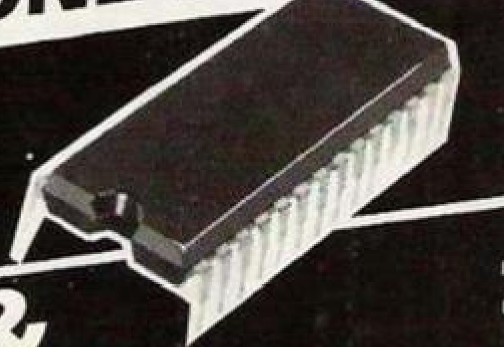
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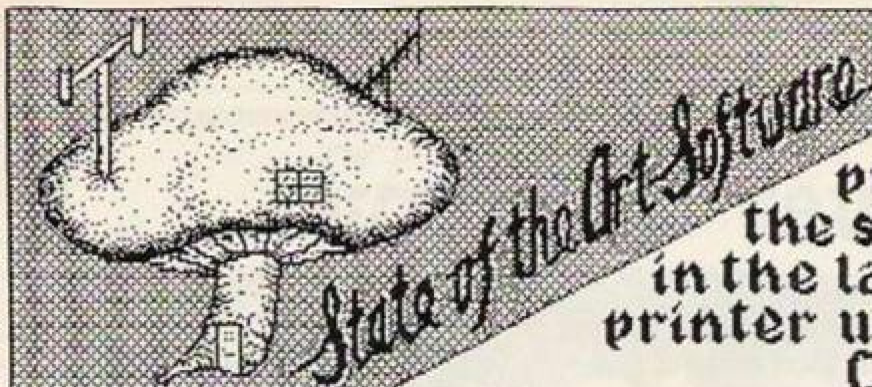
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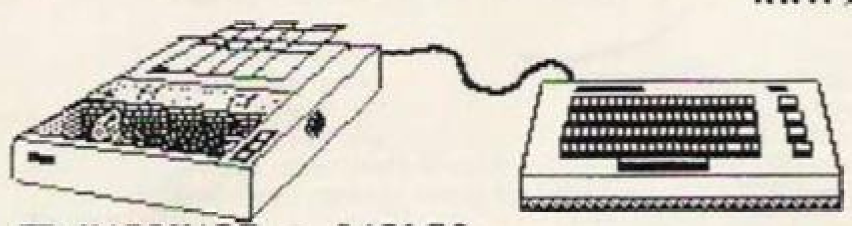


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500 useful QL references in an ARCHIVE file (too long for one cartridge with Utilities and Morse).

FOR SPECTRUM/QL/BBC

WD Morse Tutor (base £4)
From absolute beginnewr to beyond RYA and Amateur Radio receiving. Adjust pitch. Set speed to your test level (4.18 wpm). Learn from single characters, via groups with wide spaces to random sentences; decrease spacing to normal. Write down what you hear, then CHECK on Screen or Printer (or speech for Spectrum with Currah Microspeech). Also own message, random figures, letters or mixed.

FOR SPECTRUM 48K

Tradewind (base £4)
Sailing/trading strategy game with graphic surprises.

Jersey Quest (base £4)
Text adventure with Bergerac and the Dragon. (not disc)

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Two or more programs on one medium — pay medium + base. E.g. WD Utilities and RefQL for £10.00, but IMPOSSIBLE to mix QL/BBC/Spectrum programs on one medium. Send YOUR cartridge and base price, but FORMAT it FIRST in your DRIVE 1 for compatibility.

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DATEBASE

Local, national and international micro events are updated here.

IBM PC Users Show

Open to the general public so at least you can wander in and familiarise yourself with Big Blue.

The exhibition takes place at Olympia 2 from July 2-4. More information available from EMAP Business and Computer Publications on 01-837 3694.

Making Music

Be warned, some days are trade only so check with the organisers before you wander in and check out all the new chip and computer-assisted ways of making music.

The event more properly known as the British Music Fair takes place from July 30-August 4 (first three days trade only) at Olympia 2. Organised by Philbeach Events, London. Telephone 01-385 1200.



Quanta Learning Systems of Guildford has been awarded a contract by ICI to produce the training manual for the recently launched Agviser Information Service. The guide is for use by British Farmers and Agricultural Merchants who have access to the service.

Using a pictorial step-by-step approach, which won Quanta the 1985 RITA Award for the best users' training manual of the year, the guide is designed to build up the confidence of users in simple stages and to provide an "easy-to-use" reference to operating the system.

"Hooves-on" experience for Quanta's chief executive Tony Jones as he researches the Agviser Training Manual down on the farm.

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